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Progress in the Prevention and Control of Air Pollution in 1983

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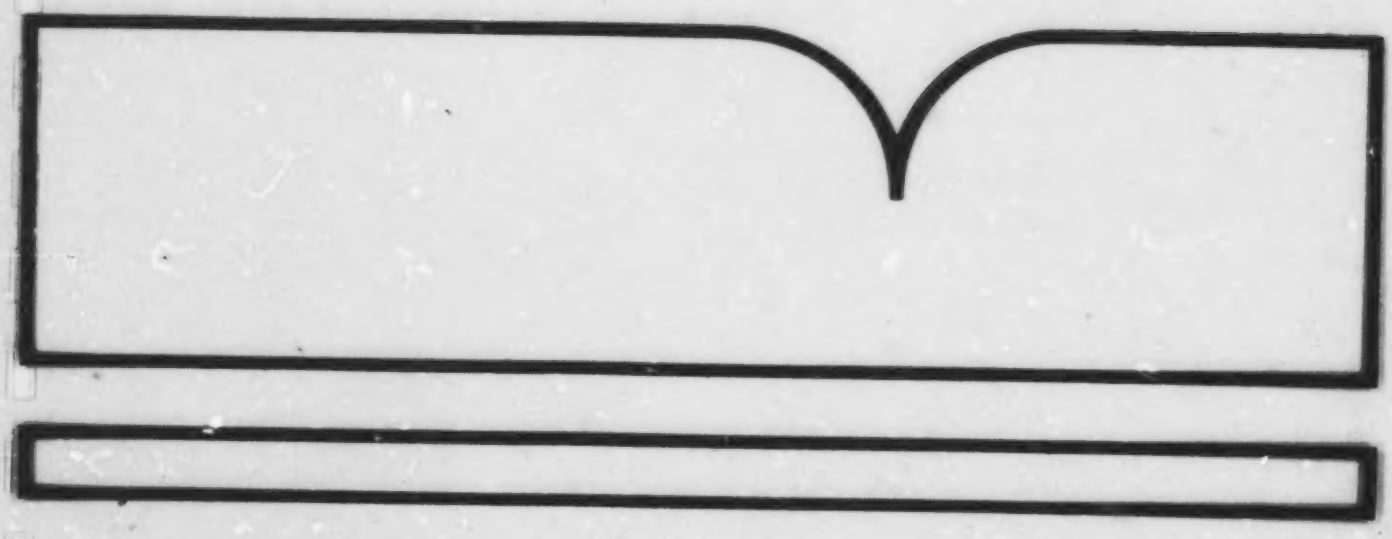

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Progress in the Prevention and Control of Air Pollution in 1983

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16. ABSTRACT

The report addresses the progress made in the prevention and control of air pollution in 1983. It covers the areas of air quality trends and monitoring, development of air quality criteria and standards, the status of State Implementation Plans, the control of stationary and mobile source emissions, enforcement, and litigation. The report is the annual report of the Administrator of EPA to the Congress in compliance with Sections 313, 202(b)(4), and 306 of the Clean Air Act, as amended.

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Progress in the Prevention and Control of Air Pollution in 1983

Control Programs Development Division

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Radiation
Office of Air Quality Planning and Standards
Research Triangle Park, NC 27711

February 1985

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PREFACE

The Clean Air Act, as amended, authorizes a national program of air pollution research, regulation, and enforcement activities. This program is directed at the Federal level by the U.S. Environmental Protection Agency (EPA). However, primary responsibility for the prevention and control of air pollution at its source continues to rest with State and local governments. EPA's role is to conduct research and development programs, set national standards and regulations, provide technical and financial assistance to the States, and, where necessary, supplement State implementation programs.

Section 313 of the Clean Air Act requires the Administrator to report on measures taken toward implementing the purpose and intent of the Act. This report covers the period January 1 to December 31, 1983, and describes the issues involved in the prevention and control of air pollution and the major elements of progress toward that goal that have been made during that time. In addition, this report also includes two other EPA reports to Congress required under the Clean Air Act, as amended:

1. Section 306 report on Federal procurement and violating facilities (Chapter VIII), and

2. Section 202(b)(4) report on measures taken in relation to motor vehicle emissions control (Chapter IX).

I. INTRODUCTION AND SUMMARY

A. OVERVIEW

This report describes the progress that the Environmental Protection Agency (EPA) has made in the prevention and control of air pollution during 1983. The following paragraphs summarize the contents of the remaining chapters of this report, especially insofar as those chapters illuminate current understanding of air quality problems, controls, and administrative apparatus. Since it takes approximately one year to assemble, analyze, and report air quality and emissions data on a national basis, the latest air quality and emissions data available for this report is for the year 1982.

B. AIR QUALITY TRENDS, MONITORING, AND MODELING

With the exception of nitrogen dioxide, data trends between 1975 and 1982 show continuing improvements across the country in ambient air quality and total pollutant emissions. For example:

- Annual average ambient total suspended particulate (TSP) levels decreased 15 percent from 1975 to 1982 while TSP emissions decreased 27 percent.

- Annual average ambient levels of sulfur dioxide (SO_2) decreased 33 percent between 1975 and 1982 and total SO_2 emissions decreased 17 percent.

- Ambient carbon monoxide (CO) levels decreased 31 percent between 1975 and 1982. Total CO emitted during this time decreased 11 percent.

- Average ambient nitrogen dioxide (NO_2) levels in 1982 were equivalent to the 1975 levels so that no long-term change was observed. After increasing between 1975 and 1979, ambient NO_2 levels decreased by 7 percent between 1979 and 1982.

- Average ambient ozone (O_3) levels decreased 18 percent between 1975 and 1982 due to a combination of emission reductions and a change in the way the monitoring instrument was calibrated. Total emissions of volatile organic compounds (VOC's), which are ozone precursors, declined approximately 13 percent during this same period.

- Ambient lead levels measured at 53 urban sites decreased 64 percent between 1975 and 1982. This is consistent with a reduction in lead consumption in gasoline of 69 percent in this period.

EPA promulgated regulations in 1979 which required States to establish and operate air monitoring networks and to report the data to EPA. Two types of permanent stations are provided for in the regulations: State and Local Air Monitoring Stations (SLAMS) and National Air Monitoring Stations (NAMS). The SLAMS, which were designed to meet the overall monitoring requirements of State Implementation Plan activities, were required to meet all provisions of the regulations by January 1, 1983. Through December 1983, there were 4,682 SLAMS monitors out of a total planned network of 4,888 monitors that met all requirements of the regulations. The NAMS, which are a subset of the SLAMS network, are designed to provide a national monitoring network as required by Section 319 of the Act. Through December 1983, there were 1,351 NAMS monitors out of a total planned network of 1,362 monitors that met all requirements of the regulations.

During 1983, EPA continued its program to evaluate several categories of models. The evaluation of urban models was completed and the results reaffirmed that these models are reasonably reliable in estimating the magnitude of the highest concentrations occurring within an area. The evaluation of complex terrain models was initiated and will be completed in 1984. Efforts to incorporate a more current chemical mechanism in ozone models used in regulatory applications were successful. During 1984, computer software and documentation will be developed to facilitate use of this procedure by the regulatory community. Work continued on developing techniques to calculate the effect of model uncertainty on air pollution control decisions. Efforts to improve guidance on air quality models and to ensure consistency in their use were continued as were efforts in the area of receptor model development and application.

C. AIR POLLUTION RESEARCH PROGRAMS

EPA's air pollution research program was divided into four major categories in 1983: Oxidants, Hazardous Air Pollutants, Gases and Particles, and Mobile Sources. The research in each of these areas was planned by a Research Committee composed of EPA research managers and representatives from EPA's program offices. Each Research Committee planned the full range of research for the pollutants covered by that Committee. The research covered scientific assessments, monitoring systems and quality assurance, health effects, environmental engineering and technology, and environmental processes and effects.

In the oxidants area in 1983, major efforts included the convening of national workshops to collect data and to discuss scientific issues necessary for revising the criteria document for ozone and other photochemical oxidants, completion of the San Diego Oxidant Transport Study, and initiation of an oxidant transport and impact study in the Ventura, California, area. In addition, several controlled human studies on the health effects of ozone were completed as were several studies on animals that investigated various health effects of ozone and nitrogen dioxide. A number of research projects that focused on reducing emissions

of volatile organic compounds and oxides of nitrogen from industrial processes were undertaken. Also, air quality models for use in developing ozone abatement strategies were developed and tested and studies were undertaken to assess the national impacts of ozone on major agronomic crops grown in the United States.

Research efforts related to hazardous air pollutants in 1983 included development of comprehensive health assessment documents for a number of different chemicals and compounds, gathering dose-response data on various pollutants, and studying the mutagenic activity of organic emissions from combustion sources. In addition, research in the hazardous air pollutants area included studies of the atmospheric transport and fate of hazardous volatile organic compounds in the atmosphere.

Research in the gases and particles area in 1983 focused on air pollution problems associated with particulate matter, sulfur dioxide, lead, and the interactive effects of combining sulfur dioxide with particles and other pollutants. Research efforts included operating an inhalable particulate monitoring network, performing complex clinical studies of the pulmonary response of asthmatics exposed to sulfur dioxide, and performing animal toxicology studies of the effects of chronic exposures to gases and particles. Projects aimed at reducing sulfur dioxide and particulate emissions from power plants and other sources were undertaken. Air quality models concerned with the transport and fate of sulfur dioxide and particles were investigated.

In the mobile sources area in 1983, research efforts emphasized reviewing key studies included in the Agency's last criteria document for carbon monoxide, monitoring population exposures to carbon monoxide, and developing a bioassay system for testing of fuels, fuel additives, and their emissions. In addition, research efforts included characterizing the gaseous and particulate emissions from in-use gasoline and diesel-powered motor vehicles.

Research efforts related to acid deposition continued to be a high priority with EPA in 1983. The Agency, in cooperation with the Interagency Task Force on Acid Precipitation, conducted research in a number of areas including the relationship between emissions and deposition, dose-response functions and extent of potential impacts, and the costs and benefits of possible mitigation strategies.

D. DEVELOPMENT OF NATIONAL AMBIENT AIR QUALITY STANDARDS

The 1977 Clean Air Act Amendments require EPA to review and, if necessary, revise the national ambient air quality standards (NAAQS) on a five-year basis. Reviews of all existing NAAQS were in progress in 1983. One review resulted in revocation of the hydrocarbon (HC) NAAQS on the basis that it was no longer appropriate and because more sophisticated techniques are now available for designing ozone control strategies.

EPA continued to review the NAAQS for carbon monoxide, nitrogen oxides, particulate matter, and sulfur oxides. Proposal of revised standards for nitrogen oxides and particulate matter are scheduled for 1984. Proposal of revised or reaffirmed standards for sulfur oxides is scheduled for 1985. In addition, work on revising the criteria documents for lead and ozone continued in 1983 and the first external review draft of the lead criteria document was released.

E. REGULATORY ASSESSMENT OF TOXIC AIR POLLUTANTS

Assessments of the need to regulate a number of potential air toxics, including polycyclic organic matter, acrylonitrile, toluene, carbon tetrachloride, and five chlorinated organic solvents were in progress in 1983. An air toxics information clearinghouse was initiated by EPA in order to assist State and local control agencies in dealing with toxic air pollutants. Work continued to integrate toxics activities across the various media and a system for screening and ranking potentially toxic air pollutants was developed and applied in 1983.

F. STATUS OF AIR QUALITY MANAGEMENT PROGRAMS

A major accomplishment in the air quality management area in 1983 was the development of a policy for dealing with those areas of the country that had not attained applicable ambient air quality standards by December 31, 1982, and were therefore liable for the imposition of various sanctions under the Act. This policy established a basic framework for air quality management in the 1980's and beyond.

Other accomplishments in 1983 included work leading toward the development of revised regulations and guidance documents for State implementation of the revised particulate matter national ambient air quality standard and negotiation of a settlement agreement with the Environmental Defense Fund on a suit that had been filed to compel EPA to promulgate plans for protection of visibility for States that had not developed visibility plans.

The Agency made considerable progress in 1983 in carrying out its responsibilities under the Act regarding the preconstruction review of new and modified stationary sources. Part of this progress was reflected in the increased number of States that assumed responsibility for implementation of the prevention of significant deterioration (PSD) program. In addition, EPA entered into a settlement agreement with industry petitioners in the suit filed by the Chemical Manufacturers Association which challenged the Agency's PSD and nonattainment new source review programs. This agreement required that EPA propose certain regulatory changes and the Agency satisfied an important part of this requirement in 1983.

One of EPA's most important air quality management initiatives undertaken in 1983 was the development, in partnership with State and local air pollution control agencies, of the National Air Audit System. This system was developed to contribute to the existence of nationally consistent State and local programs that would pursue attainment of the various objectives of the Clean Air Act.

In 1983, EPA and the Natural Resources Defense Council (NRDC) negotiated a settlement agreement regarding EPA's actions in regard to State plans implementing the national ambient air quality standard for lead. The agreement, which was entered by the court in July 1983, established various schedules for obtaining State implementation plans (SIP's) for States that had not yet submitted them and for acting on State submissions on which EPA had not taken final action.

EPA continued to support various emissions trading activities in 1983. One group of such activities included bubble trades which allow existing plants or groups of plants to treat all of their emission points as though they were under a giant bubble and thereby minimize control costs by controlling the more cost-effective sources first. A second such activity was emissions reduction banking which allows firms to get credit for surplus emission reductions and to store them in a legally protected manner.

In 1983, EPA continued to provide technical training in the abatement and control of air pollution. Through classroom presentations, self-study courses, graduate programs, and technical assistance to State training efforts, 1766 individuals received training in a variety of topics during 1983.

G. CONTROL OF STATIONARY SOURCE EMISSIONS

In the area of stationary source controls, work progressed on the development of emissions standards for those major source categories not yet regulated under new source performance standards (NSPS). NSPS for five new categories were promulgated in 1983 and existing NSPS for two categories were revised. Ten promulgations are planned for 1984. Control techniques guidance documents for three source categories also were published in 1983.

Section 112 of the Act authorizes EPA to establish national emission standards for hazardous air pollutants (NESHAP). Regulations under this section limiting coke oven emissions and benzene emissions from a number of sources in the chemical and petroleum industries were in preparation in 1983 as were regulations governing asbestos emissions and arsenic emissions from several sources.

Also in 1983, EPA continued to make progress in delegating responsibility for implementing NSPS and NESHAP programs to the State and local air pollution control agencies. EPA also continued to maintain the best

available control technology/lowest achievable emission rate (BACT/LAER) Clearinghouse in order to assist State and local agencies in their BACT and LAER determinations.

H. STATIONARY SOURCE COMPLIANCE

As of the end of 1983, approximately 89 percent of the stationary sources in the country were reported as achieving compliance with applicable air pollution control regulations and an additional 3 percent were in compliance with schedules to install controls. Whereas past enforcement efforts have focused on sources of particulate matter and sulfur dioxide, future efforts will be also directed toward other problems of significance such as volatile organic compounds.

EPA also made considerable progress in the first 21 months of the significant violator program. An initial list of 482 sources was established and an additional 340 sources were identified after the initial list was established. In this same period, 484 sources (representing the vast majority of the original list) were brought into compliance or placed on an acceptable compliance schedule.

In 1983, EPA developed a compliance strategy for stationary sources of air pollution which will serve as the basis of the compliance program for the immediate future. The strategy emphasizes resolving violations by significant violators. It places emphasis on allowing the States more flexibility in implementing inspection programs, increasing the use of continuous emission monitoring and similar techniques, and emphasizing compliance by sources that violate VOC provisions of the SIP's.

In 1982, EPA issued a policy on enforcement against sources in primary nonattainment areas (other than areas that had received an attainment date extension) not in compliance with the Clean Air Act on or after December 31, 1982. Of the 226 sources initially subject to the policy, 140 sources had been brought into final compliance or had been placed on Federal or State compliance schedules by the end of 1983. The remaining sources on the list generally had some type of Federal or State action pending or in process that would resolve the violation.

EPA directed a considerable portion of its air enforcment efforts in 1983 toward compliance with NESHAP. Two cases were settled and eleven cases were filed regarding the vinyl chloride NESHAP while two cases were filed to enforce the asbestos NESHAP.

Under the Steel Industry Compliance Extension Act (SICEA), EPA was given authority to extend, for eligible corporations, deadlines for meeting air pollution requirements. During 1983, EPA's air enforcement program completed action on all applications submitted under SICEA by filing implementing decrees for those companies found to be eligible under the Act and by pursuing enforcement actions against those companies found not to be eligible.

I. CONTROL OF MOBILE SOURCE EMISSIONS

In 1983, EPA undertook a number of standard setting activities related to various vehicle categories. One action was the promulgation of final rules for 1984 and later model year light-duty vehicles and trucks that implement the provisions of Section 206 of the Act related to compliance with national emission standards regardless of altitude. In addition, EPA promulgated a final rule allowing manufacturers to demonstrate compliance with diesel particulate emission standards on a fleetwide average basis. Other regulatory activities included promulgation of a new standard for evaporative emissions from heavy-duty trucks with gasoline engines, modification of useful life definitions for light-duty trucks and heavy-duty engines, and revision of the hydrocarbon and carbon monoxide standards from 1985 and later model year heavy-duty trucks.

In 1983, EPA extended a pilot program allowing alternative methods in determining the durability of emission control systems in light-duty vehicles and trucks. EPA also proceeded with a study whose goal is to identify the most efficient ways to achieve in-use vehicle compliance with emissions standards. In addition, the Agency also took steps to assure that inspection maintenance (I/M) programs were implemented in each locality where they are required. By the end of 1983, 20 areas in 31 States had initiated I/M programs.

EPA undertook in 1983 a number of actions related to enforcement of motor vehicle emissions standards and fuel regulations. These included requiring the recall of vehicles with emissions problems, issuing decisions on requests from automobile manufacturers for waiver of NO_x standards for diesel engine powered automobiles, and conducting inspections to measure the lead content of fuels. In addition, EPA promoted the initiation of State and local programs aimed at deterring tampering with vehicle emissions control systems, developed guidelines for State and local anti-tampering and anti-fuel switching programs, and modified its program to deal with imported vehicles to make the process work more smoothly and efficiently.

J. LITIGATION

The U.S. Courts of Appeals decided 15 cases under the Clean Air Act in 1983. The most important case decided in 1983 was Small Refiner Lead Phase-Down Task Force v. EPA in which the D.C. Circuit upheld most aspects of EPA's decision to reformulate its lead-in-gasoline regulations in a way that would increase their stringency over time and modify certain provisions related to small refiners.

Four other decisions related to various aspects of EPA's motor vehicles control program. Other decisions in 1983 related to the areas of sulfur oxides control, prevention of significant deterioration, the system for attaining air quality standards, and EPA's regulations for assessing penalties under Section 120 of the Act.

II. AIR QUALITY TRENDS, MONITORING, AND MODELING

This chapter describes current trends in ambient air quality levels (the concentration of a given pollutant in the atmosphere) as well as trends in the estimated emissions into the air of the various pollutants. In addition, the chapter discusses the topics of air quality monitoring and air quality modeling. Data on ambient air quality levels and emissions are through 1982, the latest year for which EPA has complete statistics.

A. NATIONAL AIR QUALITY AND EMISSION TRENDS[1]

National long-term (1975 through 1982) improvements can be seen for sulfur dioxide (SO_2), carbon monoxide (CO), and lead (Pb). Improvements can also be seen for ozone (O_3) and nitrogen dioxide (NO_2) in the period 1979 through 1982 and for total suspended particulate (TSP) between 1978 and 1982.

In the case of O_3, a major drop in ambient concentration levels occurred between 1978 and 1979 largely due to a change in the O_3 calibration procedure. Therefore, special attention is given to the 1979 through 1982 period because the change in the calibration procedure is not a factor during this time.

All of the ambient air quality trend analyses which follow are based on monitoring sites which recorded at least 6 of the 8 years of data in the period 1975 through 1982. In each of these years, annual data completeness criteria also had to be met. As a result of these criteria, only a subset of the total number of existing sites are used for trends purposes.

Total Suspended Particulate (TSP) - Annual average TSP levels measured at 1768 sites decreased 15 percent from 1975 to 1982. This corresponds to a 27 percent decrease in estimated TSP emissions during this period. TSP air quality levels generally do not improve in direct proportion to estimated emission reductions because air quality levels are influenced by factors such as wind blown dust and reentrained street dust which are not included in the emission estimates. Most of the air quality improvement occurred during the last several years, and was due not only to reductions in TSP emissions, but also to more favorable meteorology in 1982. An analysis of meteorological conditions for 1982 indicated a potential for lower TSP concentrations due to abnormally high precipitation.

Sulfur Dioxide (SO_2) - Annual average SO_2 levels measured at 351 sites with continuous SO_2 monitors decreased 33 percent from 1975 to 1982. A comparable decrease of 39 percent was observed in the trend in the composite average of the second maximum 24-hour averages. An even

greater improvement was observed in the estimated number of exceedances of the 24-hour standard, which decreased 91 percent. Correspondingly, there was a 17 percent drop in sulfur oxide emissions during this period. The difference between emissions and air quality trends is believed to arise because the use of high sulfur fuels was shifted from power plants in urban areas, where most of the monitors are, to power plants in rural areas which have fewer monitors. Further, the residential and commercial areas, where the monitors are located, have shown sulfur oxide emission decreases comparable to SO_2 air quality improvements. These decreases in sulfur oxide emissions are due to a combination of energy conservation measures and the use of cleaner fuels in the residential and commercial areas.

Carbon Monoxide (CO) - Nationally, the second highest nonoverlapping 8-hour average ambient CO air quality levels at 196 sites decreased at a rate of approximately 5 percent per year, with an overall reduction of 31 percent between 1975 and 1982. An even greater improvement was observed in the estimated number of exceedances, which decreased 87 percent. CO emissions decreased 11 percent during the same period. Because CO monitors are typically located to identify potential problems, they are likely to be placed in traffic saturated areas that may not experience significant increases in vehicle miles of travel. As a result, the air quality levels at these locations are expected to improve at a rate faster than the nationwide improvement in emissions.

Nitrogen Dioxide (NO_2) - Annual average NO_2 levels, measured at 276 sites, increased from 1975 to 1979 and then began declining. The 1982 ambient NO_2 levels are equivalent to the 1975 levels, so that there is no long-term change. The trend pattern in the estimated nationwide emissions of nitrogen oxides is similar to the NO_2 air quality trend pattern, with nitrogen oxides emissions increasing only by a total of 5 percent between 1975 and 1982. Between 1979 and 1982 both ambient NO_2 levels and nitrogen oxide emissions showed reductions of 7 and 5 percent, respectively.

Ozone (O_3) - Nationally, the composite average of the second-highest daily maximum 1-hour O_3 values, recorded at 193 sites, decreased 18 percent between 1975 and 1982. An even greater improvement was observed in the estimated number of exceedances in the ozone season (July-September), which decreased 49 percent. Volatile organic compound (VOC) emissions decreased 13 percent during the same time period. The greater improvement observed in ozone levels than emissions may be due, in part, to the non-linear relationship between VOC emissions and ambient ozone levels, and also to the change in the calibration procedure which took place between 1978 and 1979. To eliminate the influence of the calibration change, trends were examined for the 1979-1982 time period. Ozone levels improved by 9 percent from 1979 to 1982, a period which was not influenced by the calibration change.

Lead (Pb) - The composite maximum quarterly average of ambient lead air quality levels, recorded at 53 urban sites, decreased 64 percent between 1975 and 1982. This sample of sites satisfied a minimum of 6 years of data in the 1975-82 time period and were heavily weighted by sites in Texas (51 percent) and Pennsylvania (23 percent). In all a total of only six States were represented in the sample. In order to increase the number of sites and their geographical representativeness lead trends were studied again over the 1979-82 time period. A total of 214 urban sites from 21 states satisfied the minimum data requirement of at least 3 out of the 4 years of data. An improvement in ambient lead concentrations of 43 percent was observed at these sites as compared with an improvement of 54 percent for the 46 sites mentioned above over this same 1979-82 perioc. Even this larger group of sites was disproportionately weighted by sites in California, Pennsylvania, Texas, Arizona, Illinois, and Minnesota. These six states accounted for almost 79 percent of the 214 sites represented. Contributing to the decrease in national ambient lead levels was the fact that lead consumed in gasoline dropped 69 percent from 1975-82, primarily due to the use of unleaded gasoline in catalyst-equipped cars and the reduced lead content of leaded gasoline.

B. AMBIENT AIR MONITORING

General

Section 110(a)(2)(C) of the Clean Air Act requires State Implementation Plans to include provisions for establishment and operation of systems for monitoring ambient air quality. In addition, Section 319 of the Act requires the development of uniform air quality monitoring criteria and methods and the establishment of an air quality monitoring system throughout the United States which uses uniform monitoring criteria and methods. To satisfy these requirements EPA promulgated regulations in 1979 which required States to establish and operate air monitoring stations and to report the data to EPA[2]. The two principal types of stations in the State networks are State and Local Air Monitoring Stations (SLAMS) and National Air Monitoring Stations (NAMS). The monitoring stations of the SLAMS and NAMS must adhere to the uniform monitoring criteria described in the regulation. These criteria cover quality assurance, monitoring methods, network design, and probe siting. January 1, 1981 was the deadline by which all NAMS were to meet all of the requirements in the regulations. The SLAMS had until January 1, 1983 to meet all of the provisions in the regulations.

Overall, State and local progress in meeting the requirements of the regulations has been excellent. Tables 1 and 2 summarize the SLAMS and NAMS status through December 1983. Table 3 lists, by pollutant, the number of SLAMS and NAMS.

Table 1. SLAMS Status through December 1983

	Number of Monitors	Percent of Network
Total planned network*	4888	100
Monitors operational	4763	97
Monitors in operation meeting all requirements of the regulations	4682	96

* Includes NAMS monitors

Table 2. NAMS Status through December 1983

	Number of Monitors	Percent of Network
Total planned network	1362	100
Monitors operational	1351	99
Monitors in operation meeting all requirements of the regulations	1351	99

Table 1 shows a total of 4888 planned SLAMS monitors of which 4763 or 97 percent were in operation. This number is about the maximum expected since monitoring station shutdowns routinely occur because of lost leases, urban renewal projects, and changing ambient air monitoring priorities. Of these 4763 operating monitors, 4682 or 96 percent of the total monitors are meeting all requirements of the regulations. The remaining operating monitors should meet the requirements with some small changes in monitor siting and improvements in the standard operating procedures.

Table 2 shows that of the 1362 planned NAMS, 1351 or 99 percent were in operation and were meeting all requirements of the regulations through December 1983.

Table 3. National Summary of Planned Air Monitoring Stations

Pollutant	SLAMS (including NAMS)	NAMS
TSP	2574	644
SO_2	583	222
NO_2	298	58
CO	450	115
O_3	612	216
Pb	371	107
TOTAL	4888	1362

Particulate Monitoring

As discussed in Chapter IV of this report, EPA plans to propose revisions to the national ambient air quality standards for particulate matter in 1984. One change considered is the establishment of standards for that fraction of particulate matter that is composed of particles that are nominally 10 micrometers or less in size (PM_{10}).

During 1983, data collected during 1980 and 1981 in the 120 site National Inhalable Particulate Monitoring Network were used to develop a procedure to use total suspended particulate (TSP) data to estimate the likelihood that a monitoring site would violate specified national ambient air quality standards (NAAQS) for PM_{10}. Since very little PM_{10} air quality data are available, the methodology is expected to be useful in establishing PM_{10} monitoring and control priorities, should a PM_{10} NAAQS be promulgated. Additional efforts were underway to examine TSP-PM_{10} relationships in the Inhalable Particulate network to see whether they are affected appreciably by geographic location, microscale differences, or other factors. The methodology was used to examine 1980-82 TSP data at approximately 2000 sites for which TSP data were reported to EPA in order to estimate each site's likelihood of violating prospective PM_{10} NAAQS. Data from sites judged most likely to violate prospective NAAQS were reviewed with the EPA Regional Offices to rule out natural events, temporary construction activities, and spurious data as reasons for the estimated high probability of violation.

C. AIR QUALITY MODELING

An air quality model is a set of mathematical equations that describe the atmospheric transport, dispersion, and transformation of pollutant emissions. By means of these equations, a model can be used to calculate or predict the air quality impacts of emissions from proposed new sources, emissions from existing sources, or changes in emissions from either of these source categories. These models are of great utility because they provide a means whereby the effectiveness of air pollution controls can be estimated before action is taken.

During 1983, a major EPA program to evaluate several categories of models was continued. This program was developed in response to recommendations of the American Meteorological Society (AMS) under its cooperative agreement with EPA.[3] The evaluation of urban models was completed.[4] The evaluation of complex terrain models was initiated and will be completed in 1984. A test evaluation of two short-term, long-range transport models was completed;[5] this will serve as the basis for a more complete evaluation of 6-8 such models during 1984-85. The evaluation of mobile source models will also be initiated in 1984. Guidance was completed for the use of a newer chemical mechanism in the EKMA model widely used in State Implementation Plans for ozone. During 1984, computer software and documentation will be developed which will facilitiate the use of newer chemical mechanisms by the regulatory community.

The evaluation of urban models reaffirmed that these models are reasonably reliable in estimating the magnitude of the highest concentrations occurring within an area. For long-term models there was little bias and the estimates were generally quite good. For short-term models there was somewhat greater variability in estimating the maximum concentrations and poor ability (as expected) in accurately estimating concentrations that occur at a specific time and site.

The rural[6,7] and urban[8] models were also subjected to peer scientific reviews through a cooperative agreement with the American Meteorological Society. The reviewers found all the models considered to be basically similar, with common deficiencies in the extent to which they represent the current state-of-the-art. Recommendations for improvement were provided. While some concern was expressed about poor model performance when pairings in space and time are considered, it was recognized that good agreement may be impossible to attain with current models and data bases. Agreement with observations at the upper percentiles, as has already been demonstrated, may be all that can be expected for the present. A peer scientific review of complex terrain models is planned for 1984.

Work continued on the explicit consideration of model uncertainty in decision-making. A preliminary technique to directly calculate the effect of model uncertainty on air pollution control decisions was developed.[9] During 1984 demonstration of this technique for typical

applications and analysis of its sensitivity to various factors should be possible. As a result, a quantitative assessment of the effects of model performance on effective and reliable control regulations for air pollution sources may eventually become available for use by decision-makers.

Efforts to improve guidance on air quality models[10] and to ensure consistency in their use have also continued. Additional efforts were undertaken to promote consistency between modeling applied in national regulatory impact analyses for automotive pollutants and in State Implementation Plans. These efforts led to guidance regarding ozone modeling and closer scrutiny of design values and growth rates assumed in analyses for O_3, CO, and NO_2. In addition, ozone modeling analyses submitted in connection with 1982 SIP's were scrutinized more carefully than ever before for technical accuracy. The Air Quality Model Clearing-house activities were continued to ensure that use of nonguideline techniques does not lead to inconsistent regulatory decisions. A workshop was held with modeling contacts in EPA's ten Regional Offices to improve communi-cations on the use of models and to resolve problems common to several Regions. Guidance on such problems was expanded and circulated to these offices. In addition, draft revisions to the "Guideline on Air Quality Models" were completed. Based on the results of the cooperative agreement with the American Meteorological Society, other contacts with the technical community, and extensive in-house analyses, guidance on models and associated data bases for specific regulatory programs was improved. A preliminary draft of the guideline was circulated to selected Federal and State governmental agencies; their comments have been incorporated. In 1984 the revised guideline will be subjected to a public hearing and comment. The hearing will be conducted in conjunction with the Conference on Air Quality Modeling (Third) which is required at three year intervals by Section 320 of the Clean Air Act. The guideline will be incorporated by reference in the PSD regulations, with final promulgation expected in 1985.

Work also continued in the area of receptor model development and application. A receptor model is an analytical procedure which begins with monitored air quality data and attempts to draw inferences about sources causing observed high ambient concentrations of pollutants. These methods require some knowledge of the characteristics of ambient and source samples which can be gained through chemical analysis and/or analysis of individual particles [as in the case of particulate matter(PM)]. Receptor models are likely to be utilized in performing source apportionment studies in areas which fail to meet prospective national ambient air quality standards for PM_{10}. To assist the States in preparing control strategies, guidance on the application of receptor models will be included as a part of the guidance to be developed for PM_{10} State Implementation Plan (SIP) preparation. In addition to guidance concerning the use of receptor models in SIP's, several reports describing the uses, capabilities, and limitations of several specific receptor models have been issued.[11,12] These reports are part of an ongoing series of descriptive documents for specific receptor modeling approaches.

D. INTEGRATION OF AIR DATA SYSTEMS

The Aerometric Information Reporting System (AIRS) is a new integrated data system being developed by EPA to replace entirely the existing data bases, files, and software now used by the Agency for storing and retrieving ambient air quality data, stationary source and emissions data, and source compliance data. The AIRS project was fully approved by senior EPA management in December 1980 after the earlier comprehensive feasibility study revealed the advantages of a truly integrated data system. Detailed performance specifications were completed in 1981-82 which defined the overall structure of AIRS. AIRS will be composed of two relatively separate components (air quality and facility data) but will use common sets of geographical and other codes and draw upon a state of the art data base management system.

In 1983, work progressed on the air quality component of AIRS. This segment is expected to be fully available for use by the States by late 1985 with pilot installations at the State level in 1986.

III. AIR POLLUTION RESEARCH PROGRAMS

EPA's Office of Research and Development (ORD) provided extensive technical support to EPA's air pollution control activities in 1983. ORD's air research program is divided into four major categories: Oxidants, Hazardous Air Pollutants, Gases and Particles, and Mobile Sources. The research in each of these areas is planned by a Research Committee composed of ORD managers and representatives from EPA's program offices. Each Research Committee plans the full range of research for the pollutants covered by that Committee. The research covers the areas of scientific assessments, monitoring systems and quality assurance, health effects, environmental engineering and technology, and environmental processes and effects. The discussion of 1983 research accomplishments is organized along these lines. In addition to the discussions of the four major air research programs, a discussion of ORD's research program on acid deposition is included.

A. OXIDANTS

The oxidants research program focused on air pollution problems associated with ozone, nitrogen dioxide, and volatile organic compounds (VOC's).

Scientific Assessments

National workshops were convened to collect data and discuss scientific issues necessary for revising the criteria document for ozone and other photochemical oxidants. The external review draft of the criteria document is scheduled to be completed in 1984 and the final document published in 1985.

Monitoring

Two additional standard ultraviolet spectrophotometers were delivered to EPA by the National Bureau of Standards. These units, in addition to those to be delivered in the 1984 to 1986 timeframe, will be used by the EPA Regional Offices as standards to calibrate field units utilized in measuring ozone. The National Atmospheric Background Network was terminated, and a final report is being prepared. This network provided background data on ozone concentrations in remote National Forests for use in determining trends throughout the United States. Research continued on the development of a cryogenic system for trapping and measuring VOC's and non-methane organic hydrocarbons. The San Diego Oxidant Transport Study[1] was completed and the first phase of an oxidant transport and impact study was initiated in the Ventura, California, area.

Health Effects

Several controlled human studies of the effects of ozone were completed. These studies describe changes in pulmonary structure and function, blood chemistry, and host defense mechanisms following inhalation of ozone at various

concentrations. Data was collected on three potentially susceptible subpopulations: persons with naturally-occurring respiratory infections, individuals with allergic rhinitis ("hay fever"), and children. Data from these studies are being analyzed. Two other studies of potentially sensitive groups were continued. The first is a study of asthmatics to determine if they are more or less sensitive to ozone than a normal population, and the second is a study that compares the sensitivity of various health groups (blacks, whites, males and females) to ozone.

A study was completed which further defined effects seen previously in guinea pigs, namely, that vitamin C deficiency enhances the pulmonary toxicity of nitrogen dioxide. Several studies of ozone toxicity were performed on animals with health conditions similar to human ones, such as respiratory infection and asthma. Some of the animals were exposed to ozone in a manner similar to the pattern of exposure for humans while others were exposed chronically to determine if there are long-term effects of ozone exposure.

A workshop, sponsored by the Agency, was held to identify extrapolation research needs for EPA. This workshop, which was attended by experts from all over the country, provided a forum for discussing the current state-of-the-art, and a basis upon which to formulate an extrapolation research strategy for the future.[2]

Environmental Engineering and Technology

Research activities focused on reducing emissions of VOC's and oxides of nitrogen (NO_x) from industrial processes.

In the VOC area, research focused on the usefulness of carbon adsorption, thermal and catalytic oxidation, and safety relief systems. Pilot-scale testing was initiated to investigate the design, cost, and performance of the carbon adsorption technology, and catalytic oxidation was field evaluated at six sites. Other studies demonstrated that the cost of controlling VOC emissions for paint bake ovens can be substantially reduced by the use of a microprocessor.[3]

In the NO_x area, a prototype heavy-oil, low-NO_x burner was fabricated for evaluation on an enhanced oil-recovery steam generator.[4] The dilution of primary combustion air with inert gas (vitiation) was identified for a cement kiln as one of the most effective combustion modification techniques for NO_x control.[5] Initial tests on a coal-fired, dry-rotary cement kiln have shown that vitiation can reduce NO_x emissions by approximately 40 percent. Effective NO_x reduction approaches were also identified for application to spark-ignited, gas-fired and diesel engines.[6] Tests of a gas-fired internal combustion engine equipped with a nonselective reducing catalyst showed NO_x reductions of 70 percent; tests are undrway to evaluate the effectiveness of a selective catalyst. Small pilot-scale tests of in-furnace NO_x reduction via secondary fuel injection using natural gas (reburning technology) have shown reductions as much as 60 percent whereas

smaller-scale coal-fired tests achieved 50 percent reductions. Natural draft staging-air systems were evaluated for refinery process heaters.[7] NO_x reductions of approximately 50 percent with a gain in thermal efficiency of approximately 2.5 percent were achieved for gas firing. Correlations useful in predicting NO_x emissions for specific fuels were developed as a function of coal properties using experimental data from 46 coals.

Environmental Processes and Effects

The primary focus of the research in this area is the development and testing of air quality models for use by the States in the development of State Implementation Plans (SIP's) for ozone abatement strategies. Smog chamber studies, which simulate atmospheric reactions, were conducted to determine the role of VOC's in producing elevated levels of ozone. Studies on perchloroethylene indicated that this compound may not be as important in producing ambient ozone as previously thought.[8] The scientific data base obtained from the smog chamber studies will be used in future studies to develop and test improved ozone chemical mechanisms for use in air quality models.

Evaluation studies of a first generation regional model were conducted and the preliminary results of the model's predictive capability were successful. When verified, it will be used to calculate the extent of long-range transport of ozone and its precursors from one urban area to another.

In the air ecology program, research focused on the development of scientific data to assess the national impacts of ozone on major agronomic crops grown in the United States. Studies to determine the effects of ozone on the yield of major crops through a national network of field research sites were conducted. Experimental results were integrated to develop a dose/yield response data base and economic and crop yield assessment techniques were developed for use in a preliminary national assessment of ozone impacts. This assessment is scheduled to be completed in 1984. To improve the accuracy of the assessment, sources of uncertainty such as soil moisture relationships, the effects of differing air quality conditions, and the evaluation of the impacts of ozone on hay crops are being assessed.

B. HAZARDOUS AIR POLLUTANTS

The pollutants covered by the hazardous air pollutants research program are those air pollutants that are either currently regulated or are potential candidates for being regulated under the Clean Air Act or other appropriate legislation.

Scientific Assessments

Efforts to develop comprehensive health assessment documents for chlorinated benzenes, dioxins, hexachlorocyclopentadiene, cadmium, mercury, beryllium, and vinyl chloride were initiated. Peer review workshops were held for draft documents on chloroform, chlorinated benzenes, chromium, dioxins, epichlorohydrin, ethylene dichloride, and ethylene oxide.

Several documents were released for public review and comment in 1983 or early 1984, as follows: carbon tetrachloride,[9] nickel,[10] cadmium,[11] manganese,[12] chromium,[13] vinylidene chloride,[14] epichlorohydrin,[15] trichloroethylene,[16] tetrachloroethylene,[17] methylene chloride,[18] asbestos,[19] hexachlorocyclopentadiene,[20] chloroform,[21] ethylene dichloride,[22] and ethylene oxide.[23] Following EPA Science Advisory Board review, documents on toluene,[24] acrylonitrile,[25] chlorofluorocarbon CFC-113,[26] coke oven emissions,[27] methyl chloroform,[28] and inorganic arsenic[29] were published.

Health Effects

Major accomplishments were achieved in gathering dose-response data for various hazardous air pollutants. A mammalian cell study was completed which showed 1-nitropyrene emissions to be mutagenic. Further work will be done to determine the comparative potency of these emissions. Behavioral and electrophysiological changes were measured in animals exposed to toluene. Data from this study were scheduled to be analyzed in 1984. Nickel, manganese, and cadmium compounds were administered to animals and xenobiotic metabolism was studied. Alterations in biochemical mechanisms were found, but the significance of these changes will not be known until the data are analyzed in 1984. Respiratory infectivity was studied in animals exposed to 2.5 parts per million (ppm) ethylene trichloride, 1.0 ppm toluene, or 75.0 ppm chlorobenzene. The results show no significant increase in susceptibility to respiratory infection.

Preliminary studies were completed on the kinetics of toluene following acute exposures in animals, and the data are being analyzed. Further development and validation of a test battery will proceed when the studies are published. Mutagenic activity of organic emissions from combustion sources was compared using cellular bioassays. Extractable organics were found to be fairly inactive (within two orders of magnitude), whereas particle-bound organics varied by as much as five orders of magnitude.

Monitoring

Two journal articles on reduced temperature preconcentration of volatile organics for gas chromatographic analysis were submitted.[30] A draft report on the Background Phase of Arsenic Monitoring near cotton gins was completed. Trace elements and benzo-a-pyrene were analyzed in filter samples from the national network. Field tests of source methods for vinyl chloride, arsenic, asbestos, and hexavalent chromium were carried out. Reference materials for benzene, tetrachloroethylene, and other organic vapors were issued by the National Bureau of Standards.

Environmental Processes and Effects

The overall goal of this program is to develop a data base of information on the atmospheric levels of potential hazardous air pollutants, their lifetimes in the atmosphere, and their fate. In particular, the program focuses on the atmospheric transport and fate of VOC's. In 1983, a report was prepared which identifies existing air quality data bases obtained through a variety of previously conducted studies on potentially hazardous VOC's in the atmosphere and assesses the scientific quality and applicability of these data bases.[31] The information will be useful to the Agency in preparing overall assessments on the importance of specific VOC's in the atmosphere.

Also in 1983, a final report was prepared on an ambient characterization field study in which the atmospheric concentrations and transformation products of approximately 45 potentially toxic air pollutants were determined for ten urban areas of the United States.[32] This work will provide useful information on the temporal and spatial distribution of toxic air pollutants in urban atmospheres.

C. GASES AND PARTICLES

The Gases and Particles research program focuses on air pollution problems associated with particulate matter, sulfur dioxide (SO_2), and lead, and the interactive effects of combining SO_2 and particles with other pollutants such as ozone and nitrogen dioxide.

Scientific Assessments

National workshops were convened to collect data and discuss scientific issues pertinent to revising the criteria document for lead.[33] The external review draft was completed and released. The final document is scheduled to be completed and published in 1985.

Monitoring

In 1983, the 130-station Inhalable Particulate (IP) Network was operated successfully. Twenty stations will remain operational for Federal data-collection efforts and the remainder of the equipment is being refurbished for distribution to the States for their use in operating particulate monitoring sites.

A wind tunnel was designed and constructed. The tunnel is being operated to test the operational characteristics of various devices under simulated environmental conditions for different kinds of particulates and different particulate loadings.

A study was initiated to document the visibility impairment caused by plumes from sources in Ventura, California, as these plumes moved over the nearby mountains into adjoining areas.

Quality assurance activities continued for the National Air Monitoring Sites/State and Local Air Monitoring Sites (NAMS/SLAMS) and IP networks.

Health Effects

A research strategy for quantitative extrapolations was developed by EPA scientists, with input from outside experts. This strategy provides a broad framework for performing dosimetry and sensitivity studies to develop improved risk assessments. As part of the Agency's extrapolation efforts, the lung structure of adult and infant humans and several species of animals were compared as a preliminary step in determining species sensitivity to gases.

Complex clinical studies of the pulmonary response of asthmatics exposed to SO_2 were completed. The data have been analyzed and the studies were scheduled to be reported in 1984. These studies describe group responses as functions of both SO_2 concentrations and length of exposure, and describe individual responses to SO_2 to determine bronchial sensitivity to SO_2. Another clinical study measured the acute physiological response of normal people following inhalation of gases and particles, alone and in combination.

To complement the clinical work, animal toxicology studies were done of chronic exposures to gases and particles, alone and in combination, measuring changes in pulmonary physiology, immunology, and lung morphology. Both normal and emphysemic rats were exposed. In another study of gases and particles, two groups of animals were shown to have increased susceptibility to bacterial lung infection following a total exposure of 103 days. Intratracheal instillation was used in a study of the comparative potency of several coarse mode particles in animals. In this study, animals were exposed to ferric oxide, calcium carbonate, and sodium feldspar, which have been thought to be benign. They were also exposed to silica dust, which is known to cause immunological decrements. All of the particles were found to be roughly equivalent in potency, indicating that some coarse mode particles may be more toxic than previously thought.

Environmental Engineering and Technology

A co-sponsored full scale demonstration program at the Louisville Gas and Electric Company's Cane Run Facility in 1983 verified that the dual alkali process is a reliable flue gas desulfurization alternative. The program demonstrated that high SO_2 removal efficiency (over 90 percent) can be sustained at a high reliability (less than 10 percent shutdown).[34] Another system assessed was the use of adipic acid which was tested at the TVA Shawnee Power Station near Paducah, Kentucky. Sulfur dioxide removal efficiencies in excess of 90 percent, and reliable scrubber operation were achieved.[35] The addition of adipic acid to a wet limestone flue gas desulfurization system was also evaluated at the Rickenbacker Air National Guard Base near Columbus, Ohio.[36] The efficiency of sulfur dioxide removal was raised from 55 percent to over 90 percent in a 30-day test period.

In cooperation with the Electric Power Research Institute and the Southern Company Services Utility Company, EPA has developed and demonstrated that adding amounts of sodium to coal feed can increase performance of coal burning power plants equipped with "hot side" electrostatic precipitators (ESP's).[37] These results were obtained with a 195 Megawatt (MW) coal-fired unit. Sodium conditioning reduced particulate emissions by 90 percent.

Two concepts of using two-stage ESP's for new power plants using low sulfur coals were evaluated. The two-stage precipitators were developed for pilot unit demonstrations at the TVA Bull Run Station and Public Service of Colorado's Valmont Station. Results indicate that two-stage precipitators substantially improve the performance of ESP's when low sulfur coal is burned.[38]

The use of fabric filters (baghouses) to remove particles from gas streams is of growing importance. Conventional fabric filter design does not consider the electrical properties of either the dust or the fabric. Research has shown that electrostatic forces influence the way in which the particles interact with the fabric and other particles. An electrostatically augmented fabric filter (ESFF) was developed and installed on several pilot-scale baghouses including an industrial boiler site at the DuPont Company Plant in Waynesboro, Virginia, and at a Southwestern Public Service Company facility in Amarillo, Texas. Results show that the ESFF baghouse has significant advantages over conventional baghouses.[39] The primary effect is a 50 percent reduction in pressure drop across the filter bags, and greater operating stability and reliability.

An evaluation of conventional fabric filter baghouses for particulate control in electric utility applications was completed and the data made available to support the review of the utility boiler new source performance standards. Additionally, field assessments of the performance of baghouses in conjunction with spray dryers for combined sulfur dioxide and particle capture were conducted to ascertain the reliability of this technology and the time in compliance of this technology.

Environmental Processes and Effects

Research in the gases and particles area focused on the development and validation of air quality models concerned with the transport and fate of SO_2 and particles, particularly inhalable-sized particles with diameters of ten micrometers (um) or less, as well as their effects on agricultural crops, materials, and visibility.

Urban, mesoscale, and regional particulate air quality models are required by the Regions, States, and local governments and industry to support anticipated revisions of State Implementation Plans (SIP's) for particulate matter. EPA plans to develop improved models that will predict concentration values of total fine (less than 2.5 um) and coarse (greater than 2.5 um) particle mass and chemical composition. In 1983, the development and validation of urban particulate models resulted in the completion of the Particulate Episodic Model (PEM) and user's guide.[40]

Regional scale particulate matter modeling research continued to study prolonged elevated pollutant episodes and the planetary boundary layer resulting in the development of a model to determine the time-varying mixing depth and transport flow in the planetary boundary layer. Additionally, the Cross Appalachian Tracer Experiment (CAPTEX) was conducted during September, October, and November 1983 jointly with the Department of Energy, the Electric Power Research Institute, and Canada to study regional scale transport and dispersion mechanisms to validate regional scale transport models.

Research continued on the development of improved SO_2 air quality dispersion models for use in complex terrain, particularly in the mountainous West where energy development is increasing. Data from the Small Hill Impaction Study #2 field study conducted in 1982 and earlier field studies were utilized in the continuing development of the Complex Terrain Dispersion Model (CTDM). Research in the Green River Ambient Model Assessment (GRAMA) program resulted in improved local-scale and mesoscale air quality models for Western Colorado and Eastern Utah.

Research in the Source Apportionment Methods (SAM) program to develop receptor models for apportioning suspended particulate mass to components from emission sources resulted in a project report on the second receptor modeling workshop (Quail Roost II) held in 1982,[41] a preliminary report on results of the 1982 Denver Winter Haze Study,[42] and reports on residential heating[43] and the application of SAM to various data sets.[44]

Research continued on the development of new dispersion techniques for air quality dispersion models, which are necessary to account for changes in the dispersion properties of the atmosphere with height. Reports were published on the comparison of several dispersion schemes[45] and on a workgroup summary for preparing meteorological data for routine dispersion calculations.[46] The User's Network for Applied Modeling of Air Pollution (UNAMAP) published version 5 of UNAMAP for distribution to the model user community.[47]

In the welfare effects area, research addressed ecological and material damage. The ecological program focused on the effects of air pollutant combinations (SO_2, ozone, and nitrogen dioxide). A workshop was held to evaluate the effects of pollutant combinations associated with ambient environments and to develop a research approach to evaluate this problem. Research involving material damage concentrated on the development of an atmospheric corrosion monitor to be used as a proxy for material damage caused by SO_2 and particles.

D. MOBILE SOURCES

Scientific Assessments

A panel of experts was convened to review in-depth key studies reported by the Agency in the last criteria document for carbon monoxide (CO).[48] Additional studies appearing in the literature since publication

of the criteria document were also reviewed. Based on these reviews, an addendum to the criteria document was prepared and an external review draft was completed. The final draft of the addendum was scheduled to be completed and published in 1984.

Monitoring

Two large scale field studies of population exposures to CO were completed using the newly developed miniaturized CO personal exposure monitors. In Denver, Colorado, the CO exposure profiles of 454 persons were obtained for two-day periods, giving 908 person-days of data. In Washington, D.C., the 24-hour CO exposure profiles for 712 persons were obtained. In both studies, diaries were filled out, allowing the CO exposures to be related to individual activities and locations, and CO breath samples were obtained to allow blood carboxyhemoglobin to be estimated. Initial data analyses, including CO exposure-dose modeling, were begun on this large data base. Also, a microenvironmental field study was completed of CO exposures on various roadways and in buildings in Washington, D.C. Initial steps were taken to construct a model of CO exposures, sources, and microenvironments.

Health Effects

A tier-testing bioassay system for in vitro and in vivo testing of fuels, fuel additives, and their emissions was developed and a report published. Mutagenicity and carcinogenicity were the primary endpoints. In addition, a study was initiated to study alterations in the cardiac function of both normal human subjects and those with coronary artery disease following exposure to CO while at rest and exercising.

Environmental Processes and Effects

In 1983, research in this program focused on characterizing the gaseous and particulate emissions from in-use gasoline and diesel-powered motor vehicles. Emissions from 41 in-use gasoline-powered passenger cars were analyzed for hydrocarbons, aldehydes, and organic particulates. Additionally, the factors responsible for the sensitivity of emissions to varying average speed conditions was determined. Research to characterize emissions from heavy-duty trucks and buses was scheduled to be completed in 1984.

E. ACID DEPOSITION

Research on the sources, effects, and possible mitigation strategies for controlling acid deposition continues to be a high priority for EPA. During 1983, the Agency worked closely with the other members of the Interagency Task Force on Acid Precipitation to more clearly establish and verify the relationship between emissions and deposition, determine the dose-response functions and the extent of potential impacts, and assess the relative costs and benefits of possible mitigation strategies. Research on acid deposition is organized by the following Task Force

sub-groups: Natural Sources, Man-Made Sources, Atmospheric Processes, Deposition Monitoring, Aquatic Effects, Terrestrial Effects, Effects on Materials and Cultural Sources, and Assessments and Policy Analysis. EPA contributed significantly to the following major accomplishments achieved by the Task Force in 1983 as described below.

Natural Sources

Measurements of natural sulfur compounds in the ocean suggest emissions from marine sources may contribute significantly to the production of acid precursors.

Man-Made Sources

A comprehensive emission inventory data base for 1980 was being developed and the final version was expected to be available to modelers in 1984. Models to predict the cost and emissions changes from utilities and industries based on various possible control strategies were developed and are being validated.

Atmospheric Processes

A major field experiment was performed to track the movement of tracer gases released in the Midwest and Canada over hundreds of miles. In addition studies of the role of clouds in processing sulfur dioxide into acidic sulfates were performed. The development of a major Eulerian model for long-range transport was initiated.

Deposition Monitoring

Three research sites were established to test improved methods of monitoring wet and dry deposition, precipitation in chemistry data were analyzed, and acid deposition maps for North America were produced. The National Trends Network became fully functional and the first annual report of wet deposition data was prepared.

Aquatic Effects

A preliminary, qualitative map of the nation indicating regions where surface waters are likely to be most sensitive to acidification was produced, and a preliminary survey of drinking water in the Northeast was completed. In addition, long-term monitoring of aquatic resources (chemistry and biota) in key sensitive regions continued. The planning for a major survey of lakes was undertaken.

Terrestrial Effects

Extensive long-term studies continued to investigate whether acid deposition has caused changes in the rate of growth and species composition. An analysis of tree ring data indicated a possible synergistic effect between deposition and other stress factors. Agricultural experiments using simulated acid rain were also continued.

Effects on Materials and Cultural Resources

Operations at four field sites continued, and the site selection process for additional stations in the U.S. and in Canada was initiated. Prototype, movable covers that separate the effects of wet from dry deposition were field tested. Chamber studies to determine the role of moisture in air pollution began. Collection of service life and life cycle cost data was initiated. Work on assembling inventories of common materials and cultural properties also began.

Assessments and Policy Analysis

The Critical Assessment Review Papers detailing the current state of knowledge about acid deposition and its effects were completed and distributed for public comment.[49] Investigations into the methodology of conducting integrated assessments, which bring together the various scientific and economic aspects of the program, have continued. A framework for coordinating the activities of the individual task groups for the 1985 Assessment was completed.

IV. DEVELOPMENT OF NATIONAL AMBIENT AIR QUALITY STANDARDS

The 1977 Clean Air Act Amendments require EPA to review regularly and revise, if necessary, all of the national ambient air quality standards (NAAQS). Reviews of all existing NAAQS were in progress during 1983.

In 1983, EPA revoked the existing NAAQS for hydrocarbons (which was originally established as a guide for attaining the NAAQS for photochemical oxidants) on the basis that it was no longer appropriate and because there are now much more sophisticated techniques available for designing control strategies for photochemical oxidants (ozone).[1]

During 1983, work continued on finalizing EPA's proposal of August 18, 1980, to revise the NAAQS for carbon monoxide (CO).[2] Additional review and comment from the public and by the Clean Air Scientific Advisory Committee (CASAC) was conducted in 1983 on several new issues that were raised since proposal.[3] A draft Addendum to the revised criteria document for CO[4] and a new draft staff paper[5] which interprets the critical studies cited in the criteria document for standard-setting purposes were reviewed and concurred on by CASAC.

The revision to the criteria document for nitrogen oxides (NO_x) was completed in 1982.[6] The NO_x staff paper,[7] which interprets the critical studies in the criteria document for use in the standard-setting process and provides a range of values which the staff feels is most appropriate for selecting the level of the air quality standard, was reviewed and concurred on by CASAC in 1983. Proposal of standards is scheduled for 1984.

CASAC concurrence on the scientific accuracy and completeness of the staff paper for particulate matter was received in January 1982.[8] Work on the regulatory support documents was nearly completed in 1983 and proposal of a revised particulate matter NAAQS is scheduled for early 1984.

In 1983, CASAC submitted a closure letter on the staff paper[9] for sulfur oxides (SO_x). The staff presented their recommendations to the Assistant Administrator on either reaffirming or revising the current standards. A proposal to reaffirm or revise the standards is scheduled for 1985.

Work on revising the criteria documents for ozone and lead was initiated in late 1981, with initial drafts of chapters for the documents completed in 1982. Public workshops on the draft criteria document chapters were held in 1983. Work on the regulatory support documents was initiated in 1982 and continued in 1983. Release of the first external review draft of the lead criteria document[10] occurred in the fall of 1983 and release of the first external review draft of the ozone document is scheduled for 1984.

Also in 1983, the Agency continued its efforts to develop methodologies for using risk assessment in setting NAAQS, as has been suggested by a number of groups, including the National Commission on Air Quality. The CASAC has set up a subcommittee to assist and advise EPA in applying risk assessment to the lead NAAQS review.

V. REGULATORY ASSESSMENT OF TOXIC AIR POLLUTANTS

In 1983, recommendations on whether to regulate polycyclic organic matter and acrylonitrile under the Clean Air Act were developed, with proposal of the Agency's decision anticipated in early 1984. Regulatory recommendations for toluene also were completed in 1983 and are expected to be published in 1984. Assessments containing information on the sources, emissions, public exposure, current control, and possible control improvements were completed for acrylonitrile, carbon tetrachloride, toluene, and five chlorinated organic solvents. This information is used in conjunction with the health assessment documents discussed in Chapter III of this report in order to make recommendations on the need for control of these chemicals and the appropriate regulatory mechanism to be used.

Efforts to assist State and local air pollution control offices in dealing with toxic air pollutants also increased significantly in 1983. Workshops were held in three EPA Regional Offices for the States in those Regions, and a substantial effort began to develop an Air Toxics Information Clearinghouse. In the latter effort, EPA worked closely with States and local air pollution control agencies to facilitate the voluntary exchange of information relating to substances that are toxic or may be found to be toxic. Full implementation of the clearinghouse is planned in late 1984 or early 1985.

Work continued within the Agency to integrate properly toxics activities across the various media. Of principal interest was the activity on the Toxic Integration Task Force chartered by the Deputy Administrator in 1983 and scheduled for completion in early 1984. Subgroups on risk management, risk assessment, high visibility chemicals, intermedia inconsistencies, and interagency coordination were established to evaluate and recommend improved policies and procedures.

A system[1] for screening and ranking a large number of potentially toxic air pollutants for further more detailed assessment was developed and applied in 1983. This system uses readily available data that provides an indication of the potential for adverse health effects and public exposure. Using appropriate weighting factors, the system provides a quantitative ranking which is then used for setting future priorities for additional work.

VI. STATUS OF AIR QUALITY MANAGEMENT PROGRAMS

A. DEVELOPMENT OF POLICY AND REGULATIONS

Post-1982 Attainment Policy

Part D of the Clean Air Act requires that primary national ambient air quality standards (NAAQS) for particulate matter, sulfur dioxide, nitrogen dioxide, carbon monoxide, and ozone be attained no later than December 31, 1982. State Implementation Plan (SIP) revisions providing for attainment of these standards were to have been submitted to EPA by January 1, 1979. Extensions of the attainment date up to 1987 were authorized under prescribed conditions for the carbon monoxide and ozone air quality standards. One condition was the submission to EPA of an additional SIP revision by July 1, 1982 which demonstrated attainment of these standards not later than December 31, 1987. On February 3, 1983, EPA published two rulemaking proposals relating to implementation of the primary national ambient air quality standards under the Clean Air Act.[1,2] The first notice proposed to disapprove State Implementation Plans and impose a moratorium on major stationary source construction or modification in nonattainment areas that were required to attain the standards by December 31, 1982, but were still experiencing violations. This notice also proposed to disapprove plans and impose construction moratoriums in nonattainment areas that had not received full EPA approval for plan revisions due in 1979. The second notice, depending upon the circumstances, either proposed approval or disapproval of implementation plans submitted in 1982 by States with nonattainment areas that had obtained extensions of the 1982 deadline for the carbon monoxide or ozone standards. In this notice, EPA proposed to impose construction moratoriums in all areas where it was proposing to disapprove 1982 plan submissions. In addition, the notice requested comment on the appropriateness of additional restrictions, including the withholding of air program and highway funds.

After evaluating the comments submitted in response to its proposals, EPA revised its interpretation of the Act's legal consequences of a failure to meet the 1982 attainment deadline and published a notice on November 2, 1983, taking final action on portions of the first notice described above.[3] EPA did not take any action on the proposals in the second notice, but it did describe its revised policy for dealing with nonattainment areas that had attainment date extensions. As discussed later in this chapter, action on the proposals in the second notice were published as individual Federal Register notices in early 1984.

Under the policy announced on November 2, 1983, EPA gave States an opportunity either to show that their State Implementation Plans were not deficient or to remedy their deficiencies before any of the various sanctions provided by the Clean Air Act would apply. States could show that their plans were not deficient by requesting redesignation to attainment under Section 107(d) of the Act. States could remedy deficiencies

by either implementing any undone portions of their existing plans or else by revising their existing plans. EPA prepared comprehensive guidance to be made available in early 1984 for areas that needed to implement or revise their plans.

Implementation Guidance for Revised Particulate Matter Standards

As discussed in Chapter IV of this report, EPA plans to propose revisions to the national ambient air quality standards for particulate matter in 1984. One change being considered is the establishment of standards for that fraction of particulate matter that is composed of particles that are nominally 10 micrometers or less in size (PM_{10}). In recognition of the administrative and technical impacts of such a change, in 1983 EPA prepared draft revisions to regulations and to guidance documents applicable to implementing the revised standards. The drafted regulations would revise both 40 CFR 51, "Requirements for Preparation, Adoption, and Submittal of Implementation Plans"; and 40 CFR 52, "Approval and Promulgation of Implementation Plans" to specify PM_{10} requirements for the prevention of significant deterioration and for the review of new sources in nonattainment areas and to make the technical amendments needed to accommodate a PM_{10} air quality standard. Drafts of new guidance documents and revisions to existing documents deal with (1) interim methods for measuring source emissions of PM_{10}; (2) dispersion and receptor models which can be used for PM_{10} and the input data required; (3) source-specific emission factors developed through a multi-year EPA research program that are needed to prepare PM_{10} emissions inventories; (4) new network and data reporting requirements applicable to monitoring the levels of PM_{10} in the ambient air; (5) interim PSD monitoring methods for measuring ambient PM_{10} levels before reference methods are approved and a phase-in program for operating new PM_{10} monitors for PSD; and (6) a method for using existing air quality data, which is not specific to PM_{10}, to assess PM_{10} air quality and to assist in implementation plan preparation. The revisions to the regulations and to the technical guidance will be announced in the Federal Register shortly after the proposal to revise the air quality standard and will be made available for public comment.

Visibility Protection

Section 169A of the Clean Air Act establishes as a national goal "the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution." On December 2, 1980, EPA promulgated regulations implementing this section.[4] All States which contained mandatory Class I Federal areas were to develop and submit SIP revisions to EPA which implemented these regulations.

On December 20, 1982, a number of petitioners filed suit in the United States District Court for the Northern District of California seeking to compel EPA to promulgate State plans for visibility protection under Section 110(c) of the Clean Air Act for those States which had not

submitted such plans. During 1983, EPA and the Environmental Defense Fund negotiated and signed a settlement agreement which was then submitted to the Court. The agreement provides for EPA to complete the requested promulgation within 40 months of finalization of the agreement. Court acceptance of the agreement as settlement of the suit was pending at year's end.

A Visibility Task Force was formed in 1983 to develop recommendations on a long-range strategy for dealing with visibility impairment from pollution-derived regional haze. The group is charged with defining goals, research needs, and regulatory options and serves to integrate regional haze issues in mandatory Class I Federal areas with more general visibility protection considerations under the national ambient air quality standards and with related aspects of other air pollution control programs that affect visibility. The task force will involve through membership or consultation several EPA offices, other Federal agencies, concerned States, environmental organizations, and industry. The major task force output will be a report, currently scheduled for late 1984, containing its findings and recommendations and a summary of supporting material and analyses. The group will also issue interim research and analytical recommendations.

Tall Stacks and Other Dispersion Techniques

Section 123 of the Clean Air Act requires that stationary sources of air pollution not be allowed to take credit for having stacks that are higher than that defined by "good engineering practice" (GEP) and thereby evade more stringent emissions limitations. In addition, Section 123, except for specified exemptions, does not allow sources to take credit for any other type of air pollution dispersion technique. On February 8, 1982, EPA promulgated regulations to implement Section 123.[5] Subsequently, the Sierra Club, Natural Resources Defense Council, and the Commonwealth of Pennsylvania challenged those regulations in court. On October 11, 1983, the U.S. Court of Appeals for the District of Columbia Circuit ordered EPA to reconsider portions of the regulations. The Court provided very detailed instructions to guide the Agency's thinking on remand. EPA started preparation of a response to the Court by the end of 1983 and held a public meeting in December to discuss options available to the Agency.

Section 123 prohibits the use of dispersion techniques unless such techniques were implemented before December 31, 1970. One technique, known as an intermittent control system, varies the rate of pollutant emissions according to meteorological conditions. The Agency drafted regulations in 1983 which, when finalized, will define the requirements of an implemented system.

Restructuring SIP Preparation Regulations

A major EPA goal in 1983 was to improve government regulations. The SIP preparation regulations (40 CFR 51) were selected for revision. Since promulgating the regulations in 1971, EPA had made many revisions. For example, EPA added and amended requirements pertaining to transportation control strategies, maintenance of the national ambient air quality standards, air quality monitoring, new source review, data reporting, and prevention of significant deterioration. These additions tended to make the regulations long and difficult to follow.

On October 11, 1983, EPA published in the Federal Register proposed changes to 40 CFR 51. The proposal would delete obsolete provisions and rewrite the regulations in a new format which is shorter and better organized. States using the proposed regulations to prepare SIP's will find them current and easier to follow. The proposed regulations also have a flexible structure into which future requirements can be more easily included.

B. PREVENTION OF SIGNIFICANT DETERIORATION AND NONATTAINMENT NEW SOURCE REVIEW ACTIVITIES

The Agency made significant progress in 1983 in carrying out its responsibilities under the Act regarding the preconstruction review of new and modified stationary sources. Major 1983 activities are described below.

PSD Program Transfer

EPA continued its progress in transferring implementation of the prevention of significant deterioration (PSD) program to State and local agencies. The majority of PSD permits are now issued by these agencies. As of the end of 1983, 37 State and local agencies had either full delegation of the PSD program or a PSD SIP (compared to 26 a year earlier) and 11 more had partial responsibility for the PSD program.

Chemical Manufacturers Association v. EPA

The Agency's PSD and nonattainment new source review regulations were challenged by a variety of entities. These challenges were consolidated as Chemical Manufacturers Association v. EPA (CMA), D.C. Cir. No. 79-1112. On February 22, 1982, EPA entered into a litigation settlement with the industry petitioners in which it agreed to propose certain regulatory changes. An important part of the settlement agreement was satisfied by EPA's Federal Register proposal of August 25, 1983.[6] That proposal addressed the topics of fugitive emissions in new source review applicability determinations, Federal enforceability of various emissions reductions, "buffer zones" around Class I areas, review of secondary emissions, and offset credit for past source shutdowns.

Another significant provision of the settlement deals with the means by which emissions reductions can be credited so that a source can avoid new source review of a modification or create an offset. The Clean Air Act is not specific regarding the type of system (e.g., actual or allowable emissions) to be used in granting such credits to sources, and there is risk that sources could adversely affect air quality by avoiding review through too liberal a computation of credits. Work on this portion of the settlement was on hold at the end of 1983 pending resolution of certain problems with industry petitioners.

A third aspect of the settlement involves the decision whether to propose interim and long-term relaxation of PSD increments for particulate matter in anticipation of new national ambient air quality standards for particulate matter based on fine particles. EPA's position on this matter was prepared in 1983 and will be proposed for comment when the revised particulate matter air quality standard is proposed.

The remaining part of the litigation settlement resulted in the Federal Register promulgation of June 25, 1982, in which vessel emissions were excluded from the review of marine terminals.[7] EPA was challenged on this rulemaking by the State of California and the Natural Resources Defense Council. On January 17, 1984, the D.C. Circuit Court of Appeals vacated this rulemaking in part and remanded it to the Agency for further action.

An important matter of controversy has been the definition of "source" for the purposes of nonattainment new source review. The Clean Air Act is not clear in this area. In 1980, EPA promulgated a dual source definition that minimized the opportunity for modifications to sources to avoid review in nonattainment areas. This was challenged by industry in the CMA suit, but was not of primary concern in the settlement because the Agency replaced it with a "plantwide" definition in its rulemaking of October 14, 1981.[8] The Natural Resources Defense Council claimed that the plantwide definition is inconsistent with the Act and, on August 17, 1982, the D.C. Circuit Court of Appeals ruled in their favor. EPA and industry appealed this ruling and it is now before the Supreme Court. The uncertainty over source definition has caused difficulty for the nonattainment program, especially with respect to the development of SIP's.

In its August 25, 1983, proposal mentioned above, EPA did not require that fugitive emissions from surface mining operations be included in PSD applicability determinations. The Sierra Club sued EPA on this point and on August 26, 1983, the D.C. Circuit Court of Appeals remanded this matter to the Agency for explanation of its position. EPA replied in January 1984 that it would coordinate a proposal to list surface mines with its final action on the August 25 proposal.

C. IMPLEMENTATION OVERVIEW AND ASSISTANCE

National Air Audit System

One of EPA's most important air quality management initiatives undertaken during 1983 was the development, in partnership with State and local air pollution control agencies, of the National Air Audit System (NAAS). The need for the NAAS developed as State and local air pollution control agencies assumed responsibility for an increasing number of delegated programs under the Clean Air Act. While EPA provided oversight of State and local air pollution control programs for many years, the Agency never developed guidelines to ensure national consistency in the evaluation of these programs. Officials of State and local agencies pointed out that EPA audits varied in frequency, depth, and procedure, and also were inconsistent from Region to Region and State to State. Representatives of State and Territorial Air Pollution Program Administrators (STAPPA) and Association of Local Air Pollution Control Officials (ALAPCO) recommended that EPA develop evaluation criteria for conducting audits of State and local air pollution control agencies that would be used by all Regional Offices. EPA responded to the concerns of STAPPA and ALAPCO members and agreed to participate in a STAPPA/ALAPCO/EPA workgroup charged with developing an auditing system that would ensure national consistency and confirm that State and local air pollution control programs were consistent with the national objectives of the Clean Air Act.

Standardized audit guidelines were written in 1983 by four subcommittees of the workgroup. The program areas selected by the workgroup for development of audit guidelines were: (a) air quality planning and State Implementation Plan (SIP) activity, (b) new source review, (c) compliance assurance, and (d) air monitoring. The subcommittees were chaired by State agency personnel with EPA staff serving as expeditors. All State agencies, local agencies, EPA Regional Offices, and EPA Headquarters offices were provided an opportunity to comment on a draft version of the audit guidelines. The system will be implemented in 1984 when the guidelines will be used to audit all State agencies and key local agencies.

The primary goals of the NAAS are to identify any obstacles that are preventing State and local agencies from implementing an effective air quality management program and to provide EPA with quantitative information for use in defining more effective and meaningful national programs. The objectives of the NAAS are to provide audit guidelines that EPA, State, and local agencies can use to: (1) meet statutory requirements; (2) assist in developing an acceptable level of program quality; (3) account for the achievements and needs of SIP programs to Congress and the public; (4) identify programs that need further technical support or other assistance; and (5) effectively manage available Federal, State, and local resources so that the national ambient air quality standards may be attained and maintained as expeditiously as possible.

Status of Nonattainment Areas

The following table lists those areas of the country that were not in attainment with air quality standards as of the end of 1983. Note that totals are not shown since the same area may be nonattainment for more than one pollutant.

Pollutant	Number of Nonattainment Areas
Particulate Matter (primary standard)	172
Particulate Matter (secondary standard)	148
Sulfur Oxides (primary standard)	61
Sulfur Oxides (secondary standard)	8
Nitrogen Oxides	5
Carbon Monoxide	148*
Ozone	448**

*97 areas received an extension until 12/31/87
**154 areas received an extension until 12/31/87

1982 SIP Revisions for Ozone and Carbon Monoxide

As discussed earlier in this chapter, certain areas of the country that demonstrated that the primary NAAQS for ozone (O_3) or carbon monoxide (CO) could not be attained by December 31, 1982, even with the application of all reasonably available control measures, were granted an extension of the attainment date until no later than December 31, 1987. A total of 31 States requested and were granted compliance date extensions and were therefore required to submit revised SIP's. In an action taken on February 3, 1983, EPA proposed to disapprove SIP's for 17 of the 31 States. The major deficiencies cited included failure to demonstrate attainment by 1987, lack of an approvable Inspection and Maintenance (I/M) program, and failure to adopt regulations requiring reasonably available control technology (RACT) for stationary sources of volatile organic compounds (VOC's).

Many States subsequently revised their SIP's and many of the plans previously proposed for disapproval were reproposed for approval. During 1983, EPA witnessed significant State progress toward implementation of required I/M programs. Additionally, many States committed to the adoption of additional stationary source and transportation control measures necessary for attainment of O_3/CO standards. As of January 31, 1984, EPA had proposed action on all 1982 O_3/CO SIP's (including reproposals in many cases) and had published final approvals for eight States. The Agency is on a schedule leading to final actions on all 1982 O_3/CO SIP's by September 1984.

Lead SIP's

In October 1978, EPA published a national ambient air quality standard for airborne lead under Section 109 of the Clean Air Act.[9] Section 110 of the Act required each State to adopt and submit to EPA within nine

months a plan to implement that standard. The Act further required EPA to approve or disapprove these SIP's within four additional months and to promulgate SIP's within two additional months beyond that for States that did not meet the requirements specified in the Act. In 1982, the Natural Resources Defense Council (NRDC) and other parties filed suit in the U.S. District Court for the District of Columbia to require EPA to promulgate lead SIP's for those States that had not yet submitted them and to approve or disapprove lead SIP's that had been submitted but on which EPA had not taken final rulemaking. The Lead Industries Association and St. Joe Minerals Corporation intervened in the suit on behalf of EPA.

The EPA and NRDC negotiated a Settlement Agreement which was entered by the court on July 26, 1983. The agreement allowed States additional time to prepare and submit lead SIP's before EPA must prepare a Federal plan and established different schedules for different categories of States. For States that had already submitted SIP's before EPA reached agreement with NRDC, the agreement required EPA to publish final approval or proposed disapprovals by November 1983. With the exception of one extension requested of the court, EPA achieved this objective. For States with either major sources of lead or recent violations of the lead standard but which had not yet submitted lead SIP's, the agreement set a date of August 1, 1983, for submission of SIP's. The agreement required EPA to propose rulemaking on these SIP's by January 3, 1984. EPA received draft or final plans from all such States except for one area, and published proposed rulemaking on these plans on or before January 3, 1984. The agreement established further dates in 1984 and 1985 for completing rulemaking on the problem States and for action on the other States that do not have any known problems. For the 56 States and Territories at the end of 1983, 27 have submitted complete SIP's on which EPA published final rulemaking; 22 have submitted draft or final SIP's that cover complete States, but on which EPA has not yet completed rulemaking; and 7 had not submitted draft or final SIP's that cover complete States.

Processing of SIP Revisions

During 1982, efforts were focused on changes in the SIP review process that would accelerate review of routine and noncontroversial SIP actions and reduce the duplication of efforts between the States, Regional Offices, and Headquarters. These efforts consisted of the full implementation of three improved SIP processing procedures developed and tested in late 1981. These procedures resulted in a reduction of 93 percent of the SIP backlog by July 1, 1982. In addition, the new procedures allowed EPA to process SIP actions at about the same rate as received.

In 1983, continuing efforts were made to process SIP revisions at a rate that would avoid future backlogs. The major emphasis in 1983 was placed on improving the internal operating procedures of the SIP review process. These efforts consisted of developing modified procedures for processing, tracking, and accounting for SIP revisions. Computer programs were revised to improve tracking efficiency and provide an early warning system for packages nearing deadlines. A Standing SIP Review Committee was established to meet at regular intervals to resolve controversial issues and problems arising in SIP packages. A SIP Policy Committee was also established to meet as needed to review actions involving major national issues and to resolve conflicts. The changes which were made should further improve the existing SIP review process and result in a further decrease in review time, a workable method to identify and resolve problems, and improve communication and cooperation between the various review offices.

Emissions Trading

Emissions trading includes several alternatives to traditional regulation. These alternatives do not alter existing air quality requirements but simply give States and industry more flexibility to meet these requirements. Bubble trades and emissions reduction banking are two of the major emissions trading concepts being promoted by EPA.

Bubble trades allow existing plants (or groups of plants) to treat all of their emission points as though they were under a giant bubble and reduce or eliminate pollution controls where costs are high, in exchange for compensating increased control at emission sources where control costs are low. They give firms increased compliance flexibility, meet current or future pollution control requirements more quickly, make innovative control approaches profitable, and can result in significant savings over the costs of conventional controls. In 1982, EPA issued a proposed emissions trading policy to replace the original bubble policy and to streamline procedures, giving States and industry more opportunities to use bubbles in many more circumstances and geographic areas. Since that time, EPA has reviewed numerous formal comments on its policy and developed alternatives to respond to specific issues raised by the commenters. In 1983, EPA proposed the alternatives for public review and additional comment. EPA plans to issue the policy in final form after considering all of the comments that were submitted on the proposals. As of December 31, 1983, EPA approved or proposed to approve 43 bubbles saving their users an estimated $205 million over the cost of conventional pollution controls, with many producing energy savings and greater emission reductions than traditional regulation. Over 69 other bubbles averaging $3 million each in savings were under review at the State or Federal level and an additional 30 bubbles were under development by industry sources.

Bubbles can be approved by the States without case-by-case EPA review if evaluated under EPA-approved State generic trading rules that assure that no bubble will interfere with timely attainment and maintenance of

ambient air quality standards. As of December 31, 1983, EPA had approved generic trading rules for eight States which allow these States to approve bubbles without prior Federal approval. In addition, 17 generic rules were under State development. Another 14 bubbles had been approved by States under generic trading rules and at least 29 others were under review.

Emissions Reduction Banking

Emissions reduction banking allows firms to get credit for surplus emission reductions and store such emission reduction credits (ERC's) in a legally-protected manner. ERC's can be "banked" (stored) and used in bubble applications to meet control requirements for existing plants more flexibly and efficiently, as offsets to support economic growth in areas not meeting air quality standards, or in "netting" to exempt certain expansions or modernizations from new source review. Banking rules can speed trades between firms, expand opportunities for bubbles, and encourage the production of cheap ERC's at optimal times. Banking systems also provide the certainty needed for firms to invest in ERC's when meeting other control requirements, creating a pool of readily available credits that makes trading easier and speeds permit issuance while assuring progress toward clean air. As of December 31, 1983, EPA had approved Statewide banking rules in Oregon and Rhode Island and had proposed to approve a Statewide rule in Kentucky. Another 13 States had adopted banking rules but had not received EPA approval.

VOC RACT Clearinghouse

The EPA has specified that the SIP revisions for areas designated as not attaining photochemical oxidant standards should contain, as a minimum, regulations for controlling volatile organic compound (VOC) emissions from stationary sources. These regulations must provide for the implementation of reasonably available control technology (RACT). To assist the States in defining RACT, EPA prepared a series of documents, referred to as control techniques guidelines (CTG's), which address various control options for a variety of individual stationary sources. Since EPA cannot publish CTG's for all affected VOC source categories, States may have to develop regulations using information sources other than CTG's. The purpose of the VOC RACT clearinghouse is to provide a means by which State and local air pollution control agencies can exchange technical information, minimize duplication of effort and resources, and provide guidance regarding VOC controls for various sources. The VOC RACT Clearinghouse is a cooperative effort with the State and Territorial Air Pollution Program Administrators (STAPPA), the Association of Local Air Pollution Control Officials (ALAPCO), and EPA.

Emission Factors

In 1983, the Agency continued its efforts to provide technical guidance on how to estimate air pollutant emissions from various sources. Such information is used by EPA, the States, the private sector, and others in development of State Implementation Plans, permitting of sources under the prevention of significant deterioration (PSD) program, emission trading (offset/bubbles), environmental impact statements, and other applications. A vehicle for transmitting such technical information is Compilation of Air Pollutant Emission Factors.[10] In 1983, guidance was prepared or was in the process of being prepared for estimation of emissions for specific pollutants of current interest such as particulates by particle size, nickel, acrylonitrile, chloroform, carbon tetrachloride, formaldehyde, ethylenedichloride, and others. Release of documents on these and other pollutants is scheduled for 1984 pending completion of responses and any modifications resulting from public review and comment on the documents.

D. AIR POLLUTION TRAINING PROGRAMS

In 1983, EPA continued to provide technical training in the abatement and control of air pollution. This training included short course presentations (three to five days in length), self-study courses, technical assistance to others who conduct training, and the support of traineeships and fellowships for graduate air pollution training.

During 1983, EPA conducted 26 short courses in 14 different subject areas for a total of 639 students. These courses were presented in locations across the U.S. by 7 universities designated as area training centers. Technical assistance was provided to States and EPA Regional Offices for the conduct of 20 additional courses reaching a total of 388 students.

In support of the delegation of more air quality management responsibilities to the States, EPA continued emphasis on self-study courses as a means of providing training to more air pollution personnel. During 1983, 568 students applied for the 16 self-study courses presently available. At the end of 1983 over 125 applications had been received for two new courses scheduled for release early in 1984.

As an additional means of developing qualified personnel, EPA supported 27 graduate traineeships/fellowships to employees of State and local air pollution control agencies. These awards are for both part-time and full-time graduate study in the field of air pollution control.

VII. CONTROL OF STATIONARY SOURCE EMISSIONS

A. NEW SOURCE PERFORMANCE STANDARDS (NSPS)

During 1983, NSPS were promulgated for five new categories: the pressure sensitive tape and label surface coating industry,[1] Synthetic Organic Chemical Manufacturing Industry (SOCMI) equipment leaks of volatile organic compounds (VOC's),[2] the graphic arts industry,[3] bulk gasoline terminals,[4] and the beverage can surface coating industry.[5] The existing NSPS for automobile and light-duty truck surface coating operations [innovative technology waiver],[6] and four phosphate fertilizer processes[7] were revised. Standards were proposed for eight new categories: SOCMI - VOC emissions from air oxidation unit processes,[8] SOCMI - VOC emissions from distillation unit operations,[9] VOC fugitive emission sources in petroluem refineries,[10] flexible vinyl coating and printing operations,[11] rubber tire manufacturing industry,[12] nonmetallic mineral processing plants,[13] lightweight aggregate,[13] gypsum,[13] perlite,[13] and glass manufacturing plants.[14] A revision to the averaging time provisions of the NSPS for fossil-fuel-fired steam generators was proposed.[15] The reviews of NSPS for kraft pulp mills, gas turbines, and Claus sulfur recovery plants were completed. A nitrogen oxides (NO_x) control technology document was published as were two control techniques guideline (CTG) documents; one for plants that produce high density polyethylene, polypropylene, and polystyrene resins, and one for petroleum solvent dry cleaning operations. Standards development programs now underway are planned to result in the promulgation of 10 standards, the proposal of 8 standards, completion of reviews for 6 existing NSPS, and publication of 5 CTG's for volatile organic compound sources in 1984.

B. NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP)

° Arsenic -- During 1983, NESHAP were proposed for three arsenic sources (high arsenic feedstock primary copper smelters, low arsenic feedstock primary copper smelters, and glass manufacturing plants).[16] Promulgation of standards for all of these sources is scheduled for 1984.

° Asbestos -- Revisions to the asbestos standard to reinstate work practices and to reorganize the NESHAP for clarity were proposed in 1983 and are scheduled for promulgation in 1984. The work practices were promulgated under the Clean Air Act, as amended in 1970. The Supreme Court held that work practices were not emission standards and were not authorized under the 1970 Act. The 1977 Clean Air Act Amendments allowed work practices to be used when emission standards are not feasible, hence, the proposed revisions. A revision of the demolition and renovation standards for asbestos is also scheduled for proposal in 1984.

° Benzene -- Standards development work continued in 1983 for major benzene emission sources in the chemicals and petroleum industries. A proposed NESHAP for benzene emissions from coke oven by-product plants is planned in 1984. A NESHAP for fugitive leaks of benzene in petroleum and chemical plants is scheduled for promulgation in 1984. A proposal to

withdraw proposed regulations for control of benzene emissions in maleic anhydride plants, ethylbenzene/styrene plants, and benzene storage facilities is scheduled to be published in 1984. The withdrawal is based on the fact that public health risks for these sources were determined not to be significant.

° Coke Oven Emissions -- Standards development work continued in 1983 for coke oven emissions sources in the iron and steel industry. A proposed NESHAP for coke oven emissions (wet charging and topside leaks) is planned for 1984.

C. DELEGATION OF NSPS AND NESHAP

EPA continued to make progress in 1983 in delegating responsibility for implementing the NSPS and NESHAP programs to the State and local air pollution control agencies. At the beginning of 1983, 31 States or local agencies had accepted delegation of all applicable NSPS and 45 had accepted delegation of all applicable NESHAP. The number of applicable NSPS and NESHAP vary for each State or local agency depending on the types of source catgories that either exist or are likely to be built in the future. At the end of 1983, these delegations increased to 42 for NSPS and 47 for NESHAP. These numbers represent delegation of approximately 95 percent of applicable NSPS and 95 percent of applicable NESHAP nationwide.

D. BACT/LAER CLEARINGHOUSE

New or modified facilities that are to be constructed in areas of the country that are currently attaining the national ambient air quality standards are required by the Clean Air Act to install best available control technology (BACT). In those areas of the country that have not yet achieved compliance with the air quality standards, new or modified facilities are required to meet the lowest achievable emission rate (LAER) for that particular type of source. Permits to construct new or modified sources are issued by State and local agencies only after the sources agree to comply with either BACT or LAER requirements. Often an air pollution control agency will need to establish BACT or LAER requirements either for a source type completely new to them or for a source type with which they have had only minimal experience. In these cases, the permitting agency may not be knowledgable of the more recent advances in control technology for such sources and it is extremely helpful if the agency can refer to BACT or LAER determinations made by other control agencies.

EPA established the BACT/LAER Clearinghouse several years ago in order to assist State and local air pollution control agencies by promoting the sharing of air pollution control technology information. The primary output of the Clearinghouse is an annual report of information about BACT/LAER determinations made by the various control agencies. The most recent report contains over 800 BACT/LAER determinations.[18] An updated compilation containing approximately 950 determinations is scheduled to be distributed in 1984. The report is available in hard copy and through an automated system. The automated data base can be accessed by both the public and the private sectors.

VIII. STATIONARY SOURCE COMPLIANCE

A. GENERAL

The goal of the Clean Air Act is to protect public health and welfare and enhance the quality of the nation's air. The stationary source compliance program is designed to assure compliance with air emission standards by stationary sources of air pollution, including such major facilities as power plants, steel mills, smelters, and refineries. In addition to ensuring compliance with emission limitations contained in State Implementation Plans (SIP's), EPA and delegated States are responsible for ensuring that sources comply with new source performance standards (NSPS) and national emission standards for hazardous air pollutants (NESHAP).

Through the combined efforts of industry, States, and the Federal government, as of the end of 1983 approximately 89 percent of the sources in the country were reported as achieving initial compliance and an additional 3 percent were in compliance with schedules to install controls. These efforts have largely been focused on sources which emit particulates and sulfur dioxide; now, however, the program is directing increased attention toward other problems of significance, most notably the control of volatile organic compounds (VOC's).

Beginning in 1983, EPA initiated a major effort working with States to improve the compliance data base and initiate enforcement actions relating to VOC sources. These sources are major contributors to the ozone nonattainment problem and may emit compounds which are highly toxic in nature which may be reduced through an aggressive program to enforce VOC standards. Generally speaking, widescale regulation of VOC was initiated by the SIP's which were developed in response to that part of the 1977 Clean Air Act Amendments that pertain to areas that had not attained the national ambient air quality standards. As part of those SIP's, many States adopted regulations requiring sources to comply with applicable regulations on or before December 31, 1982. It was the relatively recent passage of these compliance dates which created the need to increase the attention devoted to compliance efforts for VOC sources.

Another major component of the stationary source compliance program is the effort to return to compliance those sources meeting the definition of a "significant violator." The universe of sources covered by the program includes sources that are in violation of NESHAPs and NSPS regulations and sources in violation of a SIP if the source is of sufficient size (presumptively 250 tons/year potential emissions or 100 tons/year actual emissions of any pollutant) and is located in or impacts on a nonattainment area for the pollutant for which the source is in violation.

In the first 21 months of the significant violator program, considerable progress was made. An initial list of 482 sources was established and an additional 340 sources were identified after the initial list was established. In this same period, 484 sources (representing the vast majority of the original list) were brought into compliance or placed on an acceptable compliance schedule.

EPA developed during 1983 a compliance strategy for stationary sources of air pollution which defines in one document the major thrusts of the stationary source compliance program. Implementation of this strategy will be the principal focus of the compliance program in the next few years. The strategy continues the emphasis on resolving violations by sources meeting the definition of a significant violator. The strategy reaffirms that the present program is sound and should be continued in the future.

This strategy does suggest three significant changes that will receive increasing emphasis, beginning in 1984 and continuing into 1985. The first suggested change will allow States more flexibility in carrying out their inspection programs. The second change will increase the use of continuous emission monitoring and similar techniques within the compliance and enforcement program. The third change will emphasize the compliance of sources violating the VOC provisions of the SIPs. The strategy also outlines additional guidance that will be developed during 1984 concerning specific aspects of the compliance program, including a more comprehensive approach to assuring compliance on a more continuous basis.

B. POST-1982 ENFORCEMENT POLICY

On September 20, 1982, EPA issued a policy on enforcement against sources in primary nonattainment areas (other than areas which received an attainment date extension in accordance with the provisions of the 1977 Amendments to the Act) not in compliance with the Clean Air Act on or after December 31, 1982. The policy recognized that courts have jurisdiction to fashion relief that allows a source to continue operating in violation beyond 1982 while taking steps to come into compliance expeditiously. The policy also set forth criteria to determine the relief the Agency should seek in each case, particularly whether a compliance schedule with civil penalties would be appropriate or whether the Agency should seek closure of the source.*

As a part of the Agency's implementation of the Post-1982 Enforcement Policy, a separate tracking system was established for the 226 sources subject to the policy as of the end of 1982. By the end of 1983, of

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*NOTE: On January 11, 1984, the Deputy Administrator modified some procedural aspects of the policy. The Agency can now enter into consent decrees, rather than stipulations, to settle enforcement actions provided that they are consistent with the policy.

these 226 sources, 140 sources had been brought into final compliance or been placed on Federal or State compliance schedules. Of the remaining 86 sources on the list, 35 sources had a Federal or State civil action proceeding and 12 were subject to SIP revisions which appear to be approvable and would bring the source into compliance. The remaining 39 sources generally had some form of Federal or State action pending which should resolve the violation. Progress also was good in identifying and resolving new violators subject to the policy.

C. ENFORCEMENT OF NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

EPA directed much of its air enforcement effort in 1983 toward compliance with the National Emission Standards for Hazardous Air Pollutants, particularly vinyl chloride. During the year, the government settled two and filed eleven cases to enforce the standard for vinyl chloride. In addition, the government filed two cases to enforce the standard for asbestos. Consent decrees were lodged in both of these cases in 1983. EPA expects to place greater emphasis on enforcement of the asbestos standard following repromulgation, which is now planned for 1984, and on all aspects of the vinyl chloride standard.

D. STEEL INDUSTRY COMPLIANCE EXTENSION ACT AND ASSOCIATED ENFORCEMENT ACTIONS

During 1983, the air enforcement program completed action on all applications submitted under the Steel Industry Compliance Extension Act (SICEA) by filing implementing decrees for those companies found to be eligible under the Act and by pursuing enforcement actions against those companies found not to be eligible. Under SICEA, Congress gave the EPA Administrator authority to extend, for eligible corporations, deadlines for meeting air pollution requirements for up to three years if the company agreed to invest an amount at least equal to the deferred cost of pollution control equipment in modernization to improve the efficiency and productivity of its steel making facilities. The terms of an extension, offsetting modernization requirements, and compliance schedules were to be set forth in consent decrees.

In 1983, consent decrees implementing favorable findings under SICEA were entered for the Sharon Steel Corporation, the United States Steel Corporation, and the Wheeling-Pittsburgh Steel Corporation. (Relief had previously been granted to Ford Motor Company and Alabama By-Products Corporation.)

Three contempt actions were filed against the Jones and Laughlin Steel Corporation on January 6-7, 1983, based upon judicial decree violations at its plants located in the States of Pennsylvania, Ohio, and Indiana. A contempt action was filed on April 21, 1983, against the National Steel Corporation based upon judicial decree violations at National's Granite City Steel Division in Illinois. National Steel had withdrawn its SICEA application, and Jones and Laughlin Steel's application had been denied by EPA.

Enforcement actions previously initiated against National Steel's facilities in West Virginia and Michigan were resolved in 1983. A consent decree resolving violations at National's Weirton (West Virginia) Steel Division was entered on July 5, 1983. On May 23, 1983, a judicial decision resolved the government's enforcement action against National's Great Lakes (Michigan) Steel Division by requiring compliance "forthwith" and assessing significant stipulated penalties. A judgment order resolving consent decree violations by the Inland Steel Corporation was entered on June 28, 1983, and a contempt action against the Kaiser Steel Corporation for violations of a consent decree covering the corporation's coke batteries was resolved in January 1983 through entry of an amended decree. (Both Inland Steel and Kaiser Steel had withdrawn their SICEA applications.)

The Agency had additional steel-related enforcement actions pending at the end of 1983, including cases against Kaiser Steel (blast furnaces), Bethlehem Steel, Republic Steel, Chattanooga Coke and Chemical Company, and Bayou Steel Corporation.

E. OTHER CIVIL LITIGATION

During 1983, there were 62 stationary air cases filed in the U.S. District Courts. In addition, 33 civil actions were concluded by consent decrees or judgment orders.

F. COMPLIANCE BY FEDERAL FACILITIES

During 1983, Federal facilities demonstrated a good record of compliance with applicable air pollution regulations. As of the end of 1983, 315 (92 percent) of the 341 significant Federal facilities met applicable emissions limitations. Of the 26 remaining facilities, 18 (5 percent) are meeting compliance schedules that will bring them into compliance.

G. LIST OF VIOLATING FACILITIES

The list of violating facilities, under Section 306 of the Clean Air Act, is designed to prevent the Federal government from subsidizing certain Clean Air Act violators with contract, grant, or loan monies. No violators were listed under Section 306 of the Act in 1983.

IX. CONTROL OF MOBILE SOURCE EMISSIONS

A. INTRODUCTION

Control of motor vehicle emissions has been a Federal responsibility since 1968. The requirements of the Clean Air Act (CAA) relating to mobile sources have been subsequently refined several times, most recently in 1977. The Clean Air Act Amendments of 1977 established an ambitious regulatory program which addressed remaining problems in the motor vehicle emissions control program and bolstered efforts to attain and maintain the national ambient air quality standards for carbon monoxide (CO) and ozone (O_3). Below are listed some of the the mobile source provisions of the 1977 Act.

- A schedule was established for implementation of stringent emissions standards for automobiles--0.41 grams per mile (gpm) for hydrocarbons (HC), 3.4 gpm for CO, and 1.0 gpm for oxides of nitrogen (NO_x). The table below displays the level of control mandated by the standards:

New Light-Duty Vehicle Emissions

	Without Control	1977 CAA Standard	Percent Reduction
Hydrocarbons	8.8 gpm	.41 gpm	95%
Carbon Monoxide	87.0 gpm	3.40 gpm	96%
Oxides of Nitrogen	3.6 gpm	1.00 gpm	72%

- Similarly, the amendments tightened standards for emissions of the above mentioned pollutants from heavy-duty engines.

- Standards for the control of particulate emissions from diesel engines were legislated.

- Areas not meeting CO and O_3 ambient air quality standards were required to implement motor vehicle inspection and maintenance (I/M) programs.

Since the enactment of the 1977 Amendments, the Environmental Protection Agency has made steady progress toward achieving the Act's goals, even while addressing the economic problems that the automotive industry has faced in recent years. The Agency has made a number of modifications to its motor vehicle emissions standards in order to assure that they attain the goal of cleaner air as effectively and efficiently as possible. In 1983, EPA made significant progress toward the implementation of this program.

B. STANDARD SETTING

Light-Duty Vehicles

During 1983, the primary focus of EPA in the regulation of light-duty vehicles (LDV's) and light-duty trucks (LDT's) was the control of emissions from vehicles in high altitude areas and the control of diesel particulate emissions.

- Section 206(f)(1) of the Clean Air Act requires that 1984 and later model year LDV's comply with national emission standards regardless of the altitude at which they are sold. In 1983 EPA promulgated final rules for 1984 and later model year LDV's and LDT's implementing this section. In addition, the Agency modified existing regulations concerning earlier model year vehicles to allow the sale of low altitude vehicles in high altitude areas that already conform to national ambient air quality standards.[1]

- In 1983 EPA also promulgated a final rule allowing manufacturers to demonstrate compliance with diesel particulate emission standards on a fleetwide average rather than for each vehicle.[2] This innovation will permit manufacturers to select the most cost-effective technologies while attaining the same overall reduction in controlling particulate emissions.

Heavy-Duty Vehicles

With the achievement of effective reductions of passenger car emissions, EPA has increasingly turned its regulatory focus toward the development of parallel standards for heavy-duty trucks and other commercial vehicles. Projections indicate that these vehicles will contribute an ever-increasing percentage of the mobile source emissions generated for the rest of this century. It is therefore important to establish standards for these vehicles to help insure better air quality. Accomplishments in this area during 1983 include the following:

- EPA promulgated a new standard for evaporative emissions from heavy-duty trucks with gasoline engines.[3] This regulation will reduce non-methane hydrocarbon emissions from these vehicles by 92 percent over uncontrolled levels.

- The Agency also proposed to modify the full-life useful life definition and the half-life useful life definition for LDT's and heavy-duty engines.[4] These new definitions reflect real-life conditions more closely. They will enable EPA to more accurately evaluate the effectiveness of various emission control systems over the life of these vehicles.

- EPA revised HC and CO standards for emissions from 1985 and later model year heavy-duty trucks.[5] This regulation established a new transient test procedure and more realistic useful life provisions. It also included a modification of the standards, delaying implementation of them from 1984 to 1985, and further revising standards for model year 1987 in order to enable manufacturers to avoid the cost of developing catalytic converter technology for larger engines. This adaptation will cause virtually no delay in achieving ambient air quality standards for geographical areas not currently meeting those standards.

- EPA also moved forward in its development of standards for particulate and NO_x emissions for heavy-duty diesel engines. Proposed regulations are scheduled to be published in 1984.

Other Vehicle Categories

- EPA promulgated several changes in HC, CO, and visible smoke standards for jet engines in 1983, enhancing the enforceability of these standards in light of advances in technology. These changes more accurately reflect the performance characteristics of modern jet engines.

- EPA also made modifications to its rules concerning evaporative emissions from motorcycles.[6] Previous regulations required motorcycles to meet standards that applied to automobiles and trucks and were physically impossible for them to comply with by design.

- The Agency also moved forward in its study of railroad emissions, due to be published in 1984.

Fuels

- In October 1982, EPA published a rule revising the standards applicable to lead in gasoline. This rulemaking, expected to reduce airborne lead 34 percent more by 1990 than under the rule previously in effect, was challenged by several refiners. In 1983, EPA promulgated an amended definition of small refinery to allow small refiners more time to comply with the new regulation.[7]

- EPA continued to process applications for fuel additive waivers, primarily for methanol blends, in 1983.

- The Agency also promulgated rules substituting antiknock index for research octane number in rating unleaded gasoline in 1983.[8] This change brings EPA into conformity with industry standards of measurement.

C. PREPRODUCTION COMPLIANCE

One of EPA's long-standing techniques for assuring compliance with motor vehicle emissions standards is the preproduction certification review program. Initiated in 1968, the program entails engineering review by EPA staff of engine families representing new vehicles to be sold in the United States. Steps in the process include submission by manufacturers of technical data about respective vehicles, emissions testing of prototypes by manufacturers, review of engineering data and test results by EPA, and, in certain cases, confirmatory testing of prototypes at EPA's laboratory facility in Ann Arbor, Michigan.

In 1983 EPA extended a pilot program allowing alternative methods in determining the durability of emission control systems in LDV's and LDT's.[9] This ruling reduces the cost of certification of vehicles without weakening emission control standards. The Agency continues to develop other refinements to the certification process in order to enhance its effectiveness, reduce its burden on EPA and manufacturers, and assure its consistency with new developments in vehicle technology.

D. INSPECTION/MAINTENANCE

A strategy for dealing directly with in-use emissions problems is the encouragement of motor vehicle inspection and maintenance (I/M) programs. EPA's basic approach in this area was determined by the 1977 amendments to the Clean Air Act. Urban areas of the country which obtained an extension in the deadline for attaining the ambient air quality standards for automotive-related pollutants beyond 1982 are required by the Act to implement an I/M program. In August 1983, EPA issued a policy statement reaffirming its commitment to I/M as a vital component of pollution control plans in non-attainment areas.[10] In the statement, it reinforced its position on funding restrictions and construction moratoriums in areas which have not implemented I/M programs in the time mandated by the Act. Consistent with this guidance, EPA took steps to assure implementation of an I/M program in each locality where it is required by the Clean Air Act. By the end of 1983, 20 areas in 31 States had initiated I/M programs.

E. ALTERNATIVE COMPLIANCE MEASURES

In recent years, increasing attention has focused on the problem of excessive emissions from in-use vehicles. This emphasis has resulted from the perception that the Nation's considerable investment in vehicle emissions control technology can be squandered if for any reason the equipment does not perform as anticipated in actual use.

EPA is now proceeding with a study whose goal is to identify the most efficient way or ways to achieve in-use vehicle compliance with emissions standards. It is possible that an alternative approach could entail an expanded role for emissions averaging. An ongoing in-use vehicle testing effort is aimed at generating data for this study. Interim findings will be issued in 1984.

F. MOBILE SOURCE ENFORCEMENT

The EPA mobile source enforcement program is directed primarily toward achieving compliance with motor vehicle emissions standards and fuel regulations as required by the Clean Air Act. The major goals and objectives are to: (1) assure that both new and in-use vehicles meet emissions standards; (2) assure that emissions control systems are not removed or rendered inoperative; (3) assure that harmful additives are not present in gasoline; (4) administer statutory and California emissions standards waivers; and (5) administer the statutory emissions warranties.

Recall Program

Section 207(c) of the Clean Air Act authorizes EPA to order the recall of vehicles if a substantial number of any class of vehicles do not conform to emissions standards in actual use. During 1983, 2,441,000 vehicles were recalled either by direct order of EPA or as a result of an EPA investigation. In the same period, manufacturers voluntarily recalled 1,090,000 vehicles to correct emissions problems. EPA conducted a total of 25 recall investigations in 1983, and performed 634 tests of in-use vehicles at laboratory facilities in Springfield, Virginia and Ann Arbor, Michigan. In order to assure that emissions control systems operate properly throughout their useful lives, EPA has focused increasingly on testing and investigation of high mileage vehicles. However, a December 1983 decision of a panel of the U.S. Court of Appeals curtailed EPA's authority to recall high mileage vehicles. EPA has sought review of this decision by the full Court of Appeals.

Emissions Standards Waivers

During 1983, EPA issued decisions on 5 requests from automobile manufacturers for waiver of the 1981-1984 model year oxides of nitrogen (NO_x) emissions standard for diesel engine powered automobiles. This enabled manufacturers to continue to make and sell diesel engines while developing technology capable of meeting stricter standards.

Selective Enforcement Auditing

In order to assure that production vehicles are made in accordance with emissions standards, EPA conducts Selective Enforcement Audit (SEA) test programs at manufacturers' facilities. EPA has found that the SEA program encounters few failures, because automobile manufacturers routinely test on a voluntary basis many more vehicles than are strictly required through SEA orders. Therefore, beginning in 1981, EPA changed its SEA policy to place greater reliance on manufacturer testing programs and less on EPA-mandated audits. In 1983, EPA conducted 17 SEA test programs, including four at foreign manufacturers' facilities.

Unleaded Gasoline Enforcement Program

EPA has responsibility for enforcing Section 211 of the Clean Air Act, relating to the regulation of fuels and fuel additives. One of the regulations under this section of the Act is aimed at protecting the catalytic converters on 1975 and later model year cars.

EPA has established a nationwide fuels enforcement program to ensure that affected retail outlets comply with these regulations. This program includes sampling of the fuel at retail outlets by Regional EPA field inspectors and private or State inpectors under EPA contract, in order to measure the fuel's lead content. EPA conducted 14,360 inspections under this program during 1983.

As mentioned before in a related area, EPA developed new enforcement procedures for the revised lead phasedown program, aimed at controlling the lead content of gasoline at the refinery level. The result was a 10 percent reduction of lead use in 1983.

Tampering/Fuel Switching

EPA is also responsible for carrying out programs designed to deter tampering with vehicle emissions control systems or using leaded fuel in vehicles which require unleaded fuel. Surveys undertaken by EPA have shown tampering and fuel switching to be continuing serious problems which undermine the emissions control performance of many in-use vehicles. The latest survey indicates that about 17 percent of the vehicle fleet is subject to gross tampering, and about 12 percent to fuel switching.

Federal efforts alone cannot effectively address these problems. Consequently, EPA has promoted the implementation of State and local antitampering enforcement programs. In 1983, six local antitampering programs were set up as a result of this initiative.

EPA also has prepared a document developing guidelines for State and local antitampering and anti-fuel switching enforcement programs. This document determines the impact of tampering and fuels programs on HC, CO, and NO_x nonattainment areas, evaluating them as part of state implementation programs for those areas.

G. IMPORTS

The control of emissions from imported vehicles has become a major issue in recent years. Due to various reasons, vehicle imports have vastly increased their share of the U.S. auto market. Correspondingly,there has been a significant increase in the number of independent auto importers bringing cars into this country for resale. This has created several problems in regulating the emissions from these cars. In 1983 EPA received 6,000 applications and 22,000 inquiries concerning the importation of nonconforming autos into the U.S. In response, the Agency has modified its imports program to handle this increase in demand, and is revising its regulations to make the process work more smoothly and efficiently. Workshops were held in November and December 1983 to discuss the impact of the regulations and listen to public recommendations on changing them.

X. LITIGATION

A. INTRODUCTION

The United States Courts of Appeals decided 15 cases under the Clean Air Act in 1983. The most important single decision sustained new EPA controls on the lead content of gasoline. Four more cases fell in a somewhat related field, involving challenges to EPA regulations implementing portions of the control scheme for mobile sources of air pollution under Title II of the Act.

Five of the cases decided in 1983 involved EPA practice in controlling emissions of sulfur oxides under the Clean Air Act. Three of these involved challenges to EPA practice in approving relaxations of control requirements for sulfur oxides contained in State Implementation Plans (SIP's). One involved the grounds on which EPA could permissibly tighten these requirements. The remaining decision reviewed EPA's rules for determining the extent to which sources would be allowed to take credit for the dispersion effects of "tall stacks" in calculating the degree of emission reduction needed to meet air quality standards.

Two of the remaining five cases involved various features of the Act's prevention of significant deterioration (PSD) system, and two involved the system for attaining air quality standards. The last upheld EPA's regulations for assessing penalties under Section 120 of the Clean Air Act.

EPA was a party to all but two of these cases. It won eight of them and lost four while, in the remaining case, the decision was too mixed to characterize one way or the other.

B. MOBILE SOURCE CASES

Lead in Gasoline

In Small Refiner Lead Phase-Down Task Force v. EPA, 705 F.2d. 506, the D.C. Circuit upheld most aspects of EPA's decision to reformulate its lead-in-gasoline regulations in a way that would increase their stringency over time, eliminate separate more lenient lead-in-gasoline standards for small refiners after a transition period, and tighten the definition of small refiners entitled to separate treatment even during this transition period.

The court upheld these regulations almost in their entirety. It found that EPA was justified in finding that airborne lead remained a topic of health concern, that no special standard for small refiners was required by the Clean Air Act, and that the exact standard chosen was, on the whole, adequately explained and justified by the record.

The court invalidated EPA's establishment of a new transitional standard for small refiners tighter than the existing standard, holding, in language of some potential importance for administrative law generally, that adequate notice of the proposed tightening of the standard had not been given.

Motor Vehicle Emission Controls

In the first of three cases reviewing aspects of the emissions warranty for new motor vehicles cases to be decided, Motor Vehicle Manufacturers Ass'n v. Ruckelshaus, 719 F.2d. 1159, the D.C. Circuit considered whether EPA had properly found that "short tests" of vehicle emissions performance had been developed that correlated reasonably with results obtained on the longer and more elaborate Federal Test Procedure used to measure prototype compliance with emissions standards. The court had little difficulty in rejecting industry arguments that EPA could not compensate for the lack of perfect correlation between the two tests by adjusting upward the emission levels at which a vehicle would fail the short test, thus resolving any uncertainties in correlation by passing the vehicles that fell in the gray area.

In Automotive Parts Rebuilders Ass'n v. EPA, 720 F.2d. 142, the same court considered rules established by EPA to implement the extended emissions warranty manufacturers are required to offer for new cars. The court agreed with EPA that for the first two years or 24,000 miles after a new car is sold, manufacturers are responsible for repairing any part of the car that causes failure of a "short test," not just those parts typically associated with emission controls. The court also accepted EPA's view that a vehicle manufacturer must honor a warranty claim even when another company's defective part causes the "short test" failure, provided the part was certified for emissions equivalency under EPA's part certification program.

However, the court concluded that EPA had to provide a mechanism for auto manufacturers to be reimbursed for warranty costs by the manufacturers of the defective part. And, in Specialty Equipment Market Ass'n v. Ruckelshaus, 720 F.2d, 124, the court found EPA's reimbursement scheme to be inadequate, and remanded to EPA to develop a more effective scheme. The court also concluded that EPA had failed to articulate a reasoned basis for its decision to exclude "specialty parts" -- mostly parts designed to enhance fuel economy or performance -- from the parts certification program.

Finally, in General Motors Corp. v. Ruckelshaus, the court, by a vote of two to one, held that EPA could not require the recall for repair of vehicles that had exceeded the "useful life" of five years or 50,000 miles during which emissions standards apply at the time they came in for repair, even if they had been within their useful lives when they first began to violate standards. One of the judges dissented vigorously and

agreed with EPA that the Agency may require manufacturers to repair, at any time, vehicles that were within their "useful lives" when they first failed to meet the standards.

EPA has requested the court to rehear this case en banc.

C. SULFUR OXIDES CONTROL

In 1983, the Sixth and Seventh Circuits both upheld EPA's present policy on approving relaxations of sulfur oxides (SO_2) SIP requirements without detailed consideration of the long-range impact of any resulting SO_2 increases. They accepted EPA's position that the rapid drop-off of SO_2 concentrations with distance from the source strongly indicates that long-range effects of these emissions are likely to be minimal, and that evaluating the transformation of SO_2 into particulates, particularly over long distances, presents technical and scientific problems that the Agency has not yet successfully resolved and therefore should not be compelled to deal with in the regulatory context. New York v. EPA, 710 F.2d. 1210 (6th Cir. 1983), New York v. EPA, 716 F.2d. 440 (7th Cir. 1983).* These decisions probably terminate litigation of this question for the immediate future.

In Wisconsin Electric Power Co. v. Costle, 715 F.2d. 323 (7th Cir. 1983), the court upheld both EPA's decision to use running averages rather than block averages to conclude that a given area was not meeting the air quality standard for SO_2 and to rely on modeling results, rather than monitoring data, to reject a subsequent petition to redesignate the area back to attainment again.

Finally, in Sierra Club v. EPA, [719 F.2d 436], the D.C. Circuit reviewed and, in major part, invalidated EPA's regulations prescribing the degree to which sources could take credit for the dispersion effects of a "tall stack" in calculating the degree of emission reduction needed to meet air quality standards.

D. PREVENTION OF SIGNIFICANT DETERIORATION

Two cases decided in 1983 involved the Act's prevention of significant deterioration system.

In Sierra Club v. EPA, [715 F.2d 653] the D.C. Circuit remanded to EPA for reconsideration its decision not to include surface mines in the list of sources whose fugitive emissions will be counted in determining whether they are major emitters of air pollution for purposes of new source review under the Clean Air Act. The court found the reasons EPA gave for not including surface mines inconsistent with the reasons it had given for including certain other sources.

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*In a third suit, the Sixth Circuit decided in EPA's favor in an unpublished order. New York vs. EPA, No. 82-3426 (order issued August 12, 1983).

In Kerr-McGee Chemical Corporation v. Interior Dept., 709 F.2d. 597 (9th Cir. 1983), a case to which EPA was not a party, the court rejected a company's claim that the Interior Department had to meet certain substantive and procedural requirements before recommending to a State that it provide additional air quality protection to a national monument. It found no justifiable injury had occurred because, under the statute, the decision whether to actually provide this protection is reserved to the State, and the State had not acted.

E. OTHER APPELLATE DECISIONS

In Duquesne Light Co. v. EPA, 698 F.2d. 456, the D.C. Circuit upheld in virtually all respects EPA's regulations under Section 120 of the Clean Air Act for assessing administrative penalties against sources that delay compliance with emissions standards. In particular, the court upheld the details of the mathematical model used to calculate these penalties.

In Bethlehem Steel v. EPA, [723 F.2d 1303] the court ruled that only a State, not EPA, can now change the designation of an area as "attainment," "nonattainment," or "unclassifiable" under Section 107 of the Clean Air Act.

In Sierra Club v. Indiana-Kentucky Electric Corp., 716 F.2d. 1145 (1983), a case to which EPA was not a party, the Seventh Circuit ruled that a State Implementation Plan that has been invalidated as State law by the State courts cannot be enforced as Federal law either.

F. OTHER LITIGATION

In 1983, the Supreme Court granted certiorari to review the D.C. Circuit's decision in NRDC v. Gorsuch, 685 F.2d. 718 (1982). The case was largely briefed in 1983 and is scheduled for oral argument and decision in 1984.

Two district court cases in 1983 split on whether the present emissions standards under Section 112 of the Act for vinyl chloride contain "work practice" requirements of a sort that would require further rulemaking to be validly promulgated.

Compare United States v. Borden, Inc., 572 F. Supp. 684 (D. Mass.) (no such defect) with United States v. Ethyl Corp. [No. 83-3537 (N.D. LA, July 6, 1983)] (standard contains work practice requirements).

Finally, in another of the numerous schedule suits that mark the history of the Clean Air Act, EPA was ordered to propose hazardous emissions standards for arsenic. New York v. Gorsuch, 554 F. Supp. 1060 (S.D.N.Y.).

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16. ABSTRACT

The report addresses the progress made in the prevention and control of air pollution in 1983. It covers the areas of air quality trends and monitoring, development of air quality criteria and standards, the status of State Implementation Plans, the control of stationary and mobile source emissions, enforcement, and litigation. The report is the annual report of the Administrator of EPA to the Congress in compliance with Sections 313, 202(b)(4), and 306 of the Clean Air Act, as amended.

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